Rosetta Phase II:
Measuring and Interpreting Cultural Differences in Cognition

Final Report

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Report Documentation Page

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
23 JAN 2009	**Final**	**25-05-2007 to 24-08-2008**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
The Rosetta-II Project: Measuring National Differences (People's Republic of China and Berkeley)	**FA48690714043**
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)	5d. PROJECT NUMBER
Kaiping Peng	
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
University of California Berkeley,3429 Tolman Hall, MC#1650,Berkeley,CA,94720	**N/A**

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
AOARD, UNIT 45002, APO, AP, 96337-5002	**AOARD**
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)
	AOARD-074043

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release; distribution unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT
The Rosetta-II Project: Measuring National Differences was a multinational cultural cognition research project involving teams from Japan, Korea, Malaysia, India, China , and USA. The objective of the study was to expand upon measures made in Rosetta I. Investigators at each site focused on 1) developing a set of perceptual and simple cognitive measures that can validly predict complex cognition conceptually related to sensemaking in natural contexts; 2) delineating the relationships between these simple measure and complex cognitive functions; and 3) determining national differences in cognitive measures. In addition to the common measurement tools to be used for the research, the Korean and Japanese teams explored developing measures for Holism and Decision making Behavior respectively. A separate report combining data from all Rosetta II investigators, is being prepared by Dr. Helen Klein, under a separate contract with Ball Aerospace Corporation, Dayton, Ohio.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT **unclassified**	b. ABSTRACT **unclassified**	c. THIS PAGE **unclassified**	**Same as Report (SAR)**	**106**	

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EXECUTIVE SUMMARY

Introduction

This report documents Phase II of the Rosetta Project to identify and measure cultural differences in the way people perform complex cognitive tasks. We have taken advantage of developments in cognitive psychology to expand the test battery. This has allowed us to gain a richer picture of national differences in cognition and to capture cognitive differences important in naturalistic setting.

The rationale for the Rosetta Project is to assist multinational efforts. Allies need to understand and predict each other in order to ensure smooth coordination; disaster relief specialists need common ground in order to accommodate and support host nation personnel; negotiators and warfighters need to anticipate adversary attitudes and actions. However, time pressure usually prevent people from adequately preparing themselves for multinational interactions. The Rosetta Project was designed to develop and validate easily administered measures, and to collect data that can be used even when it is not possible to engage in additional data collection. Rosetta I, the first phase, measured critical cognitive and perceptual dimensions across national groups (Klein et al., 2006). The present phase, Rosetta II, developed a range of measures and collected data across diverse national groups to illustrate how the Rosetta Battery can support intercultural interchanges.

Participants

Seven national groups participated in the main study, each group including 196-212 participants. The Western samples were from two United States schools: The University of California-Berkeley and Wright State University. The East Asian samples were from Beijing University in China, Hokkaido University and Hokkai Gakuen University in Japan, and Seoul National University in Korea. The South Asian samples were from International Islamic University in Malaysia, and Indian Institute of Technology in India. In addition to these main samples, two exploratory groups of 30 participants each of Indonesian and Arabic speakers, attending International Islamic University were included.

Research Measures

The Rosetta II project used four types of research measures. (a) We used two self-report scales of Analytical-Holistic reasoning, the Analytic-Holism Scale (AHS) and the Dialectical Thinking Inventory (DTI), because previous research has suggested regional difference in this type of reasoning. (b) We used four measures of basic cognition: The Exclusion Task, the Word Association Test, Relevance for Facts, and Memory for Facts. (c) We assessed complex cognition using Dynamic Cognition (e.g., use of information, confirmatory information, personal vs. institutional information, dispositional vs. situational information, and certainty and intermediate decision approaches) and the Cognition in Context (including scales for causality, dialectical reasoning, hypothetical vs. concrete reasoning, tolerance for uncertainty, and power distance). (d) We examined personal characteristics by using the Positive Affect Negative Affect Scale (PANAS), the Impression Management Scale (IMS), and a Demographic Questionnaire.

All material was prepared for use in the language of participants using standard translations, testing, and scoring procedures. SPSS was used for data analysis.

Contributions
• The Rosetta Battery found highly significant differences across the seven main groups we studied (China, India, Japan, South Korea, Malaysia, US-UCB, US-WSU) for almost all of the measure and subscales. This shows that it is possible to differentiate national groups on the basis of cognition. Rosetta II also pioneered the cognitive assessment of Indonesian and Arab language speakers. The Rosetta Battery is highly sensitive to cultural differences in cognition.

The Rosetta Battery went beyond previous research on cultural cognition. In addition to standard scales and measures, The Rosetta Battery specifically examined information use, sensemaking, decision making, and planning. These higher-level processes are particularly important for practitioners who have to understand, anticipate, and direct the actions of multinational partners and adversaries. The measures of these higher-level cognitive processes are easily prepared and administered in paper or computer format.

• The Rosetta II project developed a measure for quantifying national similarities and differences. We used the data from the three samples at International Islamic University: Arabs, Malaysians, and Indonesians. All three are Islamic, yet we found that their response patterns were no more similar than chance. The Arab/Malay and Arab/Indonesian comparisons were also close to chance. In contrast, the Malay/Indonesian comparison was show a response pattern notably closer together than chance. Therefore, the cultural cognition appeared to be based on community and ethnic commonality. Our sample was small, but the type of contrast we conducted opens the door for studying underlying cultural dynamics.

• We developed a profiling protocol for visualizing the similarities and differences for pairs or triads of national groups. The profiles display the cognitive and values patterns of specific cultural groups on important dimensions. Practitioners may find it useful to compare the patterns of similarities and differences for their own cultural group versus the group with which they are interacting. In particular, the differences identify areas of likely mismatch and confusion that can be prevented by making cultural adaptations. These are critical first steps for effective interchanges with multinational partners and allies.

• The Rosetta II project provides the foundation for tools that may support intercultural exchange. The research has implications for the training of personnel to function effectively in intercultural settings. The research also can help computational models better support planning and prediction.

Next Steps
Rosetta II suggests theoretical and applied directions for future research. Data from the Rosetta Battery can help tease out the dynamics of culture and the influences such as physical ecology, ideology, and political system. One extension is to use military materials and military participants. Another type of extension would cover a wider range of national groups such as Africa and South America. Expanding the Rosetta Battery to include more simulations and naturalistic studies would improve the applicability of the work to complex, dynamic tasks.

1. INTRODUCTION

1.1 The Challenge

Globalization brings people from Western nations into working partnerships with people from regions around the world. This expands opportunities, but also introduces problems for teamwork and planning. Failure to adapt to pervasive cultural differences can disrupt commerce; endanger lives and property; and interfere with ongoing military and humanitarian operations. Cutting edge technology, developed in one region, is often incompatible with the equipment and practices of another. Training packages effective in one country can be criticized in another. As international interactions increase, we need to understand how people from other cultures perceive events, think about issues, and make decisions. We also need to predict actions, influence beliefs, and negotiate agreements with people from other nations.

The challenge presented by cultural differences is particularly salient in military operations. Humanitarian operations, asymmetrical operations, and peacekeeping operations can require U.S. troops to work with host nation citizens, foreign military forces, and non-governmental organizations (NGO) worldwide. The establishment of the U.S. African Command in 2007 speaks to this expansion. Maj. Gen Robert H. Scales (Ret.) captured the challenge of globalization when he described how in today's world, military victory "… will be defined more in terms of capturing the psych-cultural rather than the geographical high ground."[1] "Clausewitz and World War IV," *Armed Forces Journal* (2006), http://www.armedforcesjournal.com/2006/07/1866019.

During multinational interchanges, we need to understand regional behaviors, values, social roles, and cognition. While patterns of behaviors, values, and social roles have received considerable attention, cognition has been relatively neglected. Recent research has expanded the study of cognition to include complex, dynamic domains and offers new models and methods for understanding the culture in natural domains. We are now in a position to extend the study of cognition to the practical needs driven by globalization. When we encounter new allies, collaborators, or adversaries, we need tools to inform predictions, support decisions, and guide actions. Solid information about the cultural differences that direct behavior and shape decisions can help achieve needed effects and avoid confusion. This same information can guide training, support teamwork, augment computational models, and ultimately improve performance.

1.2 Goals and Aims

The Rosetta Project addresses the task of measuring the cognitive differences that are important during international interactions. Rosetta Phase I developed cognitive and perceptual measures that assess Analytic-Holistic thinking and tested these measures in samples from Japan, Korea, Taiwan, and the United States. See Klein, et al. (2006) for the full report. Based on our past research, Phase II of the Rosetta Program had four aims:

I.   Develop a battery of cognitive measures including Analytic-Holistic thinking and other critical cultural constructs. Ground the selection of measures on past research and on the ease of administration to a range of cultural groups. The battery should include cognitive scales and cognitive tasks designed to predict complex cognition in natural contexts. This

assessment battery should allow the description of new groups and, ultimately, the facilitation of cross-cultural interactions.

II.   Administer the battery to a diverse set of national groups. To assess the battery's effectiveness in discriminating divergent groups, the samples from East Asia: China, Japan, and Korea; South Asia: India and Malaysia; and the West: United States, University of California: Berkeley and Wright State University were to be recruited. In addition, there would be two exploratory samples of Indonesian and Arabic-speaking participants.

III.   Analysis the battery's effectiveness in discriminating and characterizing groups. An analysis of quantitative and qualitative data from the main samples would compare group differences and patterns of groupings. The goal was to measure and map cognitive differences in cognition. Exploratory analysis of the pilot sample's data was to be undertaken.

IV.   Evaluate Phase II outcomes. The measures were expected to tap cognitive differences across national groups and thereby forward understanding of the processes underlying complex cognition. The evaluation was also to look for scientific contributions to the understanding of culture and cultural cognition. While this is basic research, it emphasizes differences that are important during multinational teamwork, humanitarian operations, adversarial decision making, and information operations. We will also describe the implications of the research for training and computational modeling. Based on outcomes, we suggest the next steps in preparing the battery as a practical tool for cultural diagnosis.

1.3 The Nature of Culture

Culture is rooted in the physical and social ecology where unique demands and shared experiences shape cultural patterns and evolving vision (Berry, 1986; Berry, Poortinga, Segall, & Dasen, 2002; Segall, Dasen, Berry, & Poortinga, 1990; Triandis, 1994). It is responsive to the physical context: in cold climates people wear warm clothing; those from arid regions conserve water. While we readily understand these physical differences, it is easy to assume that the values and cognition of other cultures mirror our own. Research from Western scientists tends to support this universal assumption. This is, however, a dangerous assumption. The same ecological constraints that shape physical adaptation also provide adaptive values, social roles, and cognitive tools.

Cultural influences are not limited to the unit of nations. Many nations include distinct regions characterized by unique demands and distinctive ethnic, religious, and ideological patterns. Tribes, clans, and families may maintain their own behaviors, values, social roles, and cognition. Professional and organizational cultures can exert powerful influences. Finally, each person has a genetic endowment that directs and limits the acquisition of cultural elements. From these varied contributions, culture emerges to support survival, interpersonal interactions, and continuity over time.

These complex contributions and the adaptive nature of groups make it impossible to equate groups on a small number of predictor variables. Each is a unique product of history, geography,

ideology, and time. The complexity of culture means that measures and descriptions can be expected to account for only a portion of the variance found among group members. Measures remain, however, the best first characterization of a national group until detailed regional and/or individual information becomes available. They cannot replace individual profiles but do provide a good first approximation of critical features.

Two complementary approaches are used to capture culture. First, anthropology and psychiatry adopt research methods that focus on specific groups or individuals. Classical anthropology provides information about behaviors, customs, social roles, and social rules based on extended and intense observation of single groups (Kluckhohn & Strodtbeck, 1961). The outcomes are detailed and nuanced, but require great time and professional effort. Second, psychology and measurement theory adopt research methods that can quickly assess broad dimensions of difference shared by most members of a group. Hofstede and others working in the tradition of organizational psychology measured work values (Hofstede, 1980; House et al., 2006; Triandis, 1995). While these measures do not provide a comprehensive view of a group or individual, they can describe functional characteristics quickly when there is a need for immediate action. The selection of approach is best dictated by situational constraints.

1.4 The Challenge of Cultural Measurement

We were interested in national differences in cognition but the complexity of culture presents significant barriers to measurement. While national groups may appear to share a common language, there are often regional variations that develop from separation from other speakers. Groups have distinctive patterns of reacting to both formal and informal queries and vary in self-disclosure and need to look good to outsiders. Some patterns are consistent over time and others are setting specific. The implication of these differences is that data collection procedures, no matter how well defined and standardized, may have somewhat different meaning in different regions. The inclusion of researchers from the cultures under study helps mitigate this problem.

National groups also vary in cultural homogeneity. Some, like Japan, are homogenous with racial, ethnic, and language commonality and with common school curriculum. Other nations, like Malaysia include several ethnic, religious, and racial groups with different schools to serve each segment of the population. Some nations, like India, have a history of Western contact with many educated people proficient in English while others, like China, have had limited Western influence and only recent widespread English instruction. Functional properties also differentiate national groups. Korea is a powerful economic force while China and India are emerging economies. While a large proportion of young adults attend college in the United States, the proportion is much lower in India and China. National groups also differ in dependence on agriculture, standard of living, health indicators, and so on. Measures of 'cognition' are always confounded by other differences and must be considered in interpreting research findings.

The differences described above are amply reflected in our selection of nations and research sites. In addition, each participating university, has its own distinctive mission and student body. Taken together, cultural differences were expected to account for a significant portion of variance among national groups but not all of the variance among groups. We will need to

balance findings about cognition with other characteristics of the target group. The expectation is for improved predictions not final answers.

1.5 Complex Cognition

Because natural settings often demand complex activities, we introduce the distinction between microcognition and macrocognition. Traditional cognitive research, typically microcognitive, studies stable, well-defined problems and unambiguous choices in laboratory settings. The stakes were low and consequences minor. Subjects, usually college students, complete tasks alone or in small groups. The research generates rules describing behavior in well-defined situations. In laboratory studies, cognition is limited and fairly insensitive to individual and cultural differences.

Macrocognition is a recent approach to understanding cognition (Klein et al., 2003; Montgomery, Lipshitz, & Brehmer, 2004; Schraagen, Militello, Ormerod, & Lipshitz, 2008). Natural settings are often complex and marked by uncertainty, time pressure, and risk. People must attend to dynamic ongoing actions; identify changes and anomalies; and integrate sometimes contradictory information. Here highly skilled people or teams must make decisions and take actions to accomplish critical tasks. Humanitarian missions following natural disasters illustrate this complexity. Local infrastructure may be in disarray limiting the information available. Immediate needs for rescue must be balanced from sanitation activities critical for preventing disease later on. Personnel must be aware of early warning signs of problems but this is difficult in an unfamiliar environment. Failure may carry serious consequences. People must figure out what is a warning sign, organize the information into a meaningful story, continually reframe and reinterpret with change (Klein, Wolf, Militello, & Zsambok, 1995; Weick, 1995). Microcognitive research provides little help for the dynamic patterns and high stakes challenges presented during many multinational activities.

During complex and urgent intercultural interchanges, cultural differences add complexity (Klein, 2004a). Different groups may construct different realities, employ different coordination schemes, and make different decisions. Cultural differences make it difficult to anticipate and moderate the reactions of people from different nations. This makes intercultural interchanges vulnerable to misinterpretation, confusion, and dissension. Parallel problems emerge as people attempt to anticipate the decisions of competitors or adversaries. Cognitive differences reduce accurate perspective taking and anticipation.

Successful interchanges depend on being able to identify similarities and even more, to identify, understand, and mediate differences. In some cases, members of the interchange may have a good understanding of the other's expectations and logic. For example, British and American personnel share many characteristics and differ on only a few. Transactions will be relatively smooth with only occasional confusion. For national groups with very different historic, ecological, social, and ideological roots, differences are more likely to introduce conflict. Analytic-Holistic thinking is a major contributor to the differences in how people from different cultures identify problems, manage and use information, make sense, engage in decision making, and plan/replan. Below, we define this dimension and describe its place in the Rosetta Project.

1.6 Cultural Variations in Cognition

1.6.1 Analytic-Holistic Thinking

The Rosetta Project emphasized Analytic-Holistic thinking because of its broad influences in dynamic natural settings, its cultural variability, and its prominence during intercultural interactions. Our past work in civil aviation (Klein, Klein, & Mumaw, 2001; Klein, 2003), multinational peacekeeping operations (Klein, 2004b) and training (Klein & Steele-Johnson, 2007) confirm the prominent role of analytic-holistic thinking. Research underway in Wright State University's Applied Psychology is charting the relationship of Analytic-Holistic thinking to information management and sensemaking using evolving naturalistic scenarios (Lin, 2008). Even within a United States sample, this pioneer research finds significant differences in how analytic and holistic thinkers use information to identify problems, make decisions, and recall information. Holistic thinkers want more information before making initial judgments. They also prefer broader information and change their judgments readily based on this information.

Differences in this dimension appear to reflect indigenous philosophic traditions. Nisbett (2003) suggests that holistic thinking is more consistent with the philosophic tradition of Confucius while Analytic thinking is consistent with Aristotelian thought. Laboratory research has explored four manifestations of analytic-holistic thinking: attention, causal attribution, tolerance for contradiction, and perception of change (Choi, Dalal, Kim-Prieto, & Park, 2003; Ji, Nisbett, & Su, 2001; Masuda & Nisbett, 2001; Norenzayan, Smith, Kim, & Nisbett, 2002; Peng, & Nisbett, 1999). Each of these differences is linked to cognition in natural contexts (Lin & Klein, 2008). While most people use both analytic and holistic thinking, research suggests that East Asians favor holistic thinking while Westerners favor analytic thinking. Rosetta I documents these differences and, together with the earlier work provides the basis for our expectations in this Rosetta II research. Below, we first describe the four ways in which analytic and holistic thinking is expressed. We also introduce three additional measures used in Rosetta II that extend understanding of cognition in complex settings: Tolerance for Uncertainty, Power Distance, and Hypothetical–Concrete Reasoning.

Attention describes the individual's focus as directed to central features or the field as a whole. Analytic reasoning focuses on prominent and central information while Holistic reasoning is sensitive to both central and background information (Masuda & Nisbett, 2001, 2006; Masuda et al., 2008). This difference moderates attention by narrowing or broadening the information available for use in sensemaking and subsequently, decision making. Analytic-holistic thinking directs the selection of information, the search for causal factors, and the exclusion of seemingly irrelevant information. This results in differences in how people retain and use information. As attention broadens, more contextual information will be included for sensemaking.

Causal Attribution directs the search for explanations to situational or dispositional causes. Analytic thinkers target dispositional causes while holistic thinkers include situational causes (Choi, Nisbett, & Norenzayan, 1999; Ji, Peng, & Nisbett, 2000; Morris & Peng, 1994). Faced with complex events, people who use dispositional attribution attend to the unique characteristics of the person or object and assign probable cause to these contributions. Those with situational attribution see context-dependent and occasion-bound causes as most salient (Schweder &

Bourne, 1992; Wegner, 1987). Situational attribution leads to heightened sensitivity for situational information and provides a broader view of the problem. Different information is gathered and available for later use. In complex situations, information available often exceeds memory capacity. People must group information but categorization depends on the use of logical vs. intuitive reasoning (Norenzayan, Smith, Kim, & Nisbett, 2002). Analytic thinkers tend to use rules to categorize information, while holistic thinkers, using a broader range of information, tend to use intuitive similarity. Under time pressure and information overload, categorizing both facilitates and shapes decision making.

Tolerance for Contradiction describes the difference between analytic differentiation - polarizing goals and options to define the most important, on one hand, and holistic naïve dialecticism - merging goals and options by synthesis, on the other (Peng & Nisbett, 1999). While analytic thinkers look for 'the' solution, holistic thinkers adopt an intermediate approach between two solutions. Tolerance for contradiction dictates the degree of acceptance of contradictory information and goals. While Analytic thinkers see differences as true conflicts and tend to reject contradictory information. Holistic people tend to see differences as aspects of the whole and seek a middle ground to resolve the 'conflict'. Differences influence the interchange among team members contributing to difficulties with coordination, communication, planning, and decision making. These differences influence the quality of the group product.

Perception of Change (Ji et al., 2000; Choi et al., 2007). Perception of Change describes beliefs about change. Analytic thinkers tend to view phenomena as linear, moving steadily while holistic people are likely to see cyclical, non-static patterns. This means that a change in direction would be anomalous for an analytic person and a reasonable continuation for a holistic person. This difference in criteria for anomalous events leads to different willingness to change plans. Would an absence of change in a situation be an anomaly for some while the presence of changes are considered normal which means there is not an anomaly? Together, these differences may lead to different plans and disturb multinational interchanges.

1.6.2 Additional Cultural Dimensions

Tolerance for Uncertainty describes the comfort people feel in uncertain situations. Tolerance for Uncertainty measures the reciprocal of Hofstede's Uncertainty Avoidance. We use this term because we have found that practitioners have difficultly with the term 'Uncertainty Avoidance' but little trouble understanding 'Tolerance for Uncertainty'. Tolerance for Uncertainty alters the threshold for initial reaction to anomaly (Hofstede, 1980). During ongoing operations, it affects the amount of information needed to reframe understanding, the willingness to change, and the time needed to accept a new plan or interpretation.

Power distance describes the extent to which members of a group expect the uneven distribution of power (Hofstede, 1980). This modulated the input of lower status group members hastening or slowing decision making. People with lower status may be less engaging in sensemaking because they rely on information and orders from above. When there are fewer sensemakers, decision options may be less varied.

Hypothetical vs. Concrete reasoning influences the extent to which a person will use mental simulations or will seek comparable cases for sensemaking and deciding on actions (Markus & Kitayama, 1991). These two types of reasoning may influence the flexibility and precision in sensemaking. Hypothetical reasoning can generate more flexibility and innovation at the cost of precision. In contrast, concrete reasoning taps successful past experiences both personal and historic and so can generate precise plans. The plans are, however, unlikely to be surprising. Different approaches lead to different outcomes.

1.7 Research Measures

1.7.1 Analytic-Holistic tendencies:

The Analytic-Holism Scale (AHS) (Choi, Koo, & Choi, 2007)

This scale measures analytic-holistic thinking as well as its components: attention, causality, perception of change, and tolerance for contradiction (Choi, Koo, & Choi, 2007). Choi et al (2007) supported the validity of the scale using comparisons of Korean and American students, comparisons of Korean students majoring in oriental medicine with Korean students with other majors, and comparisons of AHS scores with holistic patterns of performance in causal reasoning, categorization, and prediction. Based on earlier research, the Far East nations (China, Japan, and Korea) were expected to show a preponderance of holistic thinking. The two U.S. samples, Westerners, were expected to show more analytic thinking. India and Malaysia are exploratory as research data is not available for this and most of the remaining measures. This study extends our understanding of these previously unstudied groups.

Dialectical Thinking Inventory (DTI) (Chan, Personal Communication, 1 May 2006)

The Dialectical Thinking Inventory is a self-report measure of dialectical thinking. We include two of its three subscales. The first, Tolerance for Contradiction, describes the extent to which people tolerate the presence of contradiction. The second, Holism Perspective, is the extent to which people look at focal elements of a situation rather than the situation as a whole. The Far East nations (China, Japan, and Korea) were expected to show a preponderance of dialectical thinking. The two Western samples (U.S.), were expected to show less dialectical thinking.

1.7.2 Simple Cognition

The Exclusion Task (Choi, Dalal, Kim-Prieto, & Park, 2003)

The Exclusion Task taps causal attribution (Choi et al., 2003). It measures the extent to which people judge information items as irrelevant. Analytic-Holistic thinking is expected to influence the amount of information that people exclude as they attempt to assign cause, understand situations, and make decisions. Because Holistic thinkers see interconnectedness of elements, it is assumed that they will have more difficulty dismissing information as irrelevant while analytic thinkers will dismiss information with ease (Choi et al., 2003). Because Analytic thinkers tend to emphasize internal dispositional attributes in assigning causality they were expected to exclude more information.

Choi and colleagues (2003) tested exclusion rates using Korean, American, and Asian American participants. There were marked differences between Korean and US participants. Consistent with expected differences, U.S. participants excluded more items than did Korean participants. Rosetta I found expected group differences between the U.S. sample, predicted to be analytic, and three Far Eastern samples (Japan, Korea, Taiwan), predicted to be holistic. Likewise, it is expected samples higher in holistic thinking will exclude fewer items.

Relevance of Facts (Chan, Personal Communication, 6 May 2006)

The Relevance of Facts taps the number and type of information items judged to be relevant to a given event. Because holistic thinkers focus on background and tend to make situational attribution, they were expected to select more situational facts and low relevant facts. They were also expected to provide higher ratings of relevance. Analytic thinkers with their focus on focal objects and their tendency to make dispositional attribution were expected to select facts about the person, to select fewer low relevant facts, and to rate the selected facts to be lower relevance.

Memory of Facts (Chan, Personal Communication, 10 July 2006)

The Memory of Facts is a free recall measure of the facts presented earlier in the protocol for the Relevance of Facts measure. Because holistic thinkers focus on context and tend to make situational attribution, they were expected to recall more situational facts and low relevant facts than would analytic thinkers. Analytic thinkers, with their focus on central objects and their dispositional attribution tendencies, will have greater recall of facts about the person and less recall of low relevant facts.

Word Association Test (WAT) (Chan, Personal Communication, 10 July 2006).

Norenzayan and colleagues (2002) report that analytic people tend to use rule-based reasoning, such as the attributes of objects, in categorizing whereas holistic people use familiarity-based reasoning such as relationships among objects. Ji, Zhang, and Nisbett (2004) found differences in this reasoning style affect categorization. Bilingual Chinese organized objects in a more relationally and less categorically than did European Americans. It is expected that holistic people will categorize based on relationships while analytic thinkers will categorize based on attributes.

1.7.3 Complex Cognition

The Dynamic Cognition (Klein & Lin, 2006).

The Dynamic Cognition task used two unfolding scenarios to assess complex cognition including sensemaking and information use as well as decision choices and their justification. One scenario assessed the importance of information type for sensemaking during a potentially dangerous situation. The other assessed the perceived usefulness of information based on its source during an important business meeting. Decision choices and the explanations for these choices were queried during both scenarios. Holistic and analytic differences were expected at several points during the scenarios.

Cognition in Context (Klein & Lin, 2006).

The Cognition in Context measures differences for six cultural dimensions as well as the relationships among these dimensions. It includes the cognitive dimensions of Analytic-Holistic thinking, Hypothetical-Concrete reasoning, Dialectical reasoning, Causal Attribution, as well as the values dimensions of Power Distance and Uncertainty Avoidance (Choi & Nisbett, 1998; Hofstede, 1980; Markus & Kitayama, 1991; Nisbett & colleagues, 2001; and Peng & Nisbett, 1999). It is expected that adoption of approaches to the task will reflect differences in the cognitive and values dimensions.

1.7.4 Individual Differences

Positive Affect and Negative Affect Scale (PANAS) (Watson, Clark, & Tellegen, 1988).

The Positive Affect Negative Affect Scale (PANAS) measures participants' affective response tendency. Watson and colleagues (1988) developed the PANAS to represent the structure of affect. Positive and negative affect has consistently emerged as two dominant and relatively independent dimensions in affective research. PANAS is used as a manipulation check in this study to control for participants' responses influenced by their mood states or affect. It is also interesting in the role that it may play during intercultural interchanges.

Impression Management Scale (IMS) (adapted from Paulhus, 1988).

The Impression Management Scale was designed to measure for participants' tendency to respond in a manner that is considered socially desirable. IMS is used as a manipulation check for socially desirable responses. Participants with high social desirability may respond positively to certain items. Here again, this scale is interesting in how people present themselves during intercultural interchanges.

Demographic Questionnaire

The Demographic Questionnaire queried participant characteristics including age, academic major, years in school, native language, language used with parents, and place of birth. Participants were asked if they had lived outside of their country for more than a year, the duration, and the age when they lived outside the country. The demographic information provided a description of the samples for inclusion criteria.

2. METHODS

2.1 Participants

Country Selection. Rosetta II included the original Rosetta I groups, Japan, Korea, and the United States for comparison and added key national groups for which we were able to identify and enlist top-level researchers. The sample from China replaced the Taiwan sample to tap Chinese culture. We included a sample from India and a sample of cultural Malays from Malaysia. A second United States sample was added to increase the generality of findings. We included small exploratory samples of Indonesians and of Arabic-speaking students studying in Malaysia to learn about these important groups. The new but less studied groups allowed a more robust assessment of cultural effects.

Main Samples. Participants attended Beijing University, China; Hokkaido University and Hokkai Gakuen University, Japan; Indian Institute of Technology, India; Seoul National University, Korea; International Islamic University, Malaysia; and the University of California Berkeley and Wright State University, United States. Participants were undergraduate students between 18 to 24 years of age. We excluded those participants who reported that they or their parents had not been born in the team's nation, and those who reported they had lived for at least one (1) year outside their nation of birth.

Exploratory Samples. Two samples of Arabic speakers and of Indonesians enrolled at the International Islamic University, Malaysia participated. Each sample included 30 participants. The Arabic speakers were undergraduate and graduate students between 17 to 49 years of age. The Indonesians were undergraduates between 17 to 24 years of age. There were no exclusion criteria for these two samples.

2.2 Procedures

Recruitment and Testing. Participants were recruited, compensated, and tested following the procedures provided by the Institutional Review Board of each respective university and of the Air Force Research Laboratory (AFRL). Participant either signed a form indicating consent to participate or received a cover letter explaining the roles and rights of participants. Participation was voluntary. They were given a brief introduction and a description of the research objectives. They then received a packet of study material. Participants completed all eleven measures allowing a within group comparison while the national samples allowed between groups comparison of the measures. Details related to compensation, dates, and testing durations are described in Appendix A.

The measures were administered to groups of participants in the following order: Dynamic Cognition, Word Association Test, Relevant of Facts, the Exclusion Task, Cognition in Context, Memory of Facts, Analytic-Holism Scale, Dialectical Thinking Inventory, PANAS, Impression Management Scale, and Demographic Information. Participants completed the test material at their preferred pace and were debriefed at the end of the session. Experimenter(s) were available to clarify directions and answer questions during the session.

Coordination and standardization. All research teams reviewed final procedures for test administration. Potential problems were identified and resolved prior to data collection. Procedures for data entry, scoring, and coding were developed and provided to all of the research teams. Standards for scoring of verbal responses for the complex cognition tasks were specified. Excel templates were provided for recording and submitting data. Support for each stage of the research was available. An on-line group Web site was used for coordination and for submitting data.

2.3 Research Measures

Measure Development. To provide flexibility, we selected measures that could be administered to groups and adapted for computer and/or Web based data collection. The participating research teams reviewed preliminary material, instructions and administrative procedures, and they provided suggestions to accommodate national differences. Over repeated trials, we revised the measures to reduce ambiguity and ease completion. As most of the research instruments were originally in English they were translated into the languages native to the samples. The translation-back-translation followed the procedures described by Brislin (1970).

The final eleven self-administered research measures fall into four groups. First, two self-administered scales were selected to tap Analytic-Holistic cognition: the Analytic-Holism Scale (AHS) and the Dialectical Thinking Inventory (DTI). Second, four measures assessed simple analytic-holistic thinking in attribution, information relevance, memory, and categorization, respectively: the Exclusion Task, Relevance of Facts, Memory of Facts, and the Word Association Test (WAT). Next, two tasks assessed how people manage information, make decisions, and judge the demands of dynamic contexts: Dynamic Cognition and Cognition in Context. Finally, two measures were included to capture individual differences that might modulate outcomes: Positive Affect and Negative Affect Scale (PANAS) and Impression Management Scale (IMS). A Demographic Questionnaire queried participant characteristics.

2.3.1 Analytic-Holistic Thinking: Scales

Analytic-Holism Scale (AHS).

Material   AHS is a paper-and-pencil scale (Choi, Koo, & Choi, 2007). Reliability ranged between .70-.85 with an average Cronbach's alpha of .73. There were 24 items, 6 items representing each of four components of attention, causality, perception of change, and resolution of conflict. There are six reversed scored items. Example items are *"The whole is greater than the sum of its parts," "Future events are predictable based on present situations," "It is more desirable to take the middle ground than go to extremes,"* and *"Any phenomenon has numerous numbers of causes, although some of the causes are not known."* See Appendix B for the complete scale.

Procedure   Participants were asked to rate each item on the scale ranging from 1 (strongly disagree) to 7 (strongly agree). The mean scores for the overall scale and its four components were computed for each participant. A higher score indicates holistic thinking.

Dialectical Thinking Inventory (DTI)

Material   The Dialectical Thinking Inventory is a paper-and-pencil self-report measure of dialectical thinking. We included the two DTI subscales of Tolerance for Contradiction and Holism Perspective. Each had 10 self-report items. An example of a Tolerance for Contradiction item is *"Within a team, cooperation and competition can exist at the same time."* An example of a Holism item is *"What is in fact true can become false if the situation changes."* Half of the items on the scale are reversed scored items. See Appendix C for the research material.

Procedure   Participants rated each item from 1 (strongly disagree) to 5 (strongly agree). The mean scores for its two subscales were computed for each participant. A higher score indicates dialectical thinking.

2.3.2 Simple Analytic-Holistic Reasoning: Tasks

Exclusion Task

Material   The Exclusion Task presents a brief murder mystery scenario:

> *Suppose that you are the police officer in charge of a case involving a graduate student who murdered a professor (the dead professor was the graduate student's advisor). Why would the graduate student possibly murder his or her advisor? As a police officer, you must establish the motive.*

It then listed 97 potential information items that might help understand the motivation of the murder. For example, *"Whether the professor behaved unreasonably toward the graduate student."* and *"What the graduate student's parents did for a living."* The directions ask participants to, *"Mark 'X' if Irrelevant"*. A place for responding appeared before each item. The task taps the number of items excluded when attributing a cause. See Appendix D.

Procedure   Participants review the scenario and decide which information items they consider irrelevant for making a decision about the scenario by marking an 'X'. The number of excluded items is scored for each participant.

Relevance of Facts (ROF)

Material   The Relevance of Facts taps the number and type of information items judged to be relevant. This paper-and-pencil measure consists of two very brief scenarios: an accident scenario and a car vandalism scenario. For example: *"Bill was involved in a traffic accident in which he crashed his car into the front gate of a house near the main road."* The information items varied in Attribution (Dispositional or Situational) and in Relevance (Low or High). There are 14 items in each scenario, half were situational and half were person oriented or dispositional facts. There were 8 high relevant facts and 6 low relevant facts in the accident scenario and 4 high relevant facts and 10 low relevant facts in the car vandalism scenario. For example, *"It was raining heavily at the time of the accident"* is a situational high relevant item and *"Bill enjoys social activities and situations"* is a dispositional low relevant item. See Appendix E.

Procedure   Participants receive instructions for the task. Participants judged facts as relevant or irrelevant to the scenario. For those items marked 'relevant', they then rated the importance of the item as a contributing factor using a 5-point Likert-type rating scale shown above. The task was scored for numbers of relevant and irrelevant items selected. Selected items were also scored as dispositional or situational. A higher rating indicates adoption of those items.

Memory of Facts

Material   The Memory of Facts assesses the types of items recalled from the earlier *Relevance of Facts* task as a measure of perceived importance. Participants were primed to recall earlier items using the introduction to the accident scenario. They were then asked to recall and record as many facts as they can remember. A response page with fourteen lines was provided to accommodate the 14 facts from the accident scenario. See Appendix F.

Procedure   Participants reviewed the priming page and recorded facts they remembered. Responses were coded to match facts presented in the scenario. Each fact could be dispositional, situational, or unrelated and also low or high in relevance. Scores for specific memory recall types - Low Relevant facts recall, High Relevant facts recall, Dispositional facts recall, and Situational facts recall were computed for each participant. A total number of facts recalled were also scored.

Word Association Test (WAT)

Material   The Word Association Test taps participant categorization strategies. There are 18 questions on this test. Each question had an initial triad of three words – for example: *spoon-fork-soup* – followed by three dyads options – for example: *a) spoon fork, b) spoon soup, and c) fork soup.* Each dyad included two of the three words, one dyad categorized using similar attributes, one using relationships, and one was included as a foil to avoid forcing a choice between options. The dyad options varied in order over questions. Selection reflected cognition. In this example, the spoon-fork option is based on attributes and represents analytic reasoning while spoon-soup is based on relationship and represents holistic reasoning. See Appendix G.

Procedure   Participants were asked to select the dyads having items that 'belonged together'. Responses that indicate rule-based categorization and responses that indicated relationship categories were represented by a single score. A mean score on WAT is computed for each participant where a higher score indicates the tendency to categorize using rule base or similar attributes.

2.3.3 Complex Cognition: Tasks

Dynamic Cognition

Material   Dynamic Cognition used two unfolding scenarios to tap elements of complex, dynamic cognition: sensemaking, information use, and decision making. The first scenario, *The Chemistry Class*, described a potential fire emergency in a school. Limited information was used

to create uncertainty. As the scenario unfolds, further information is introduced and responses requested. The second scenario, *The Business Meeting*, described an executive preparing for unexpected business meeting. This scenario conveys decision making under time pressure and high stakes. The scenario included queries regarding the value given to personal vs. institutional information and to dispositional vs. situational information. Personal information is information obtained from informal sources such as friends and family while institutional information is information obtained from formal sources such as brochures and published sources. Dispositional information is information about the company while situational information is information about the external environment of the company such as the industry and the economy climate where the company is located. For example, *"Calling a friend who works in Detroit to talk about TPS products"* is a personal-dispositional information item and *"Reading information about the current economic situation in Detroit"* is an institutional-situational information item. See Appendix H.

Procedure   Participants first read and responded to The Chemistry Class scenario. They then read and responded to *The Business Meeting.* As each scenario unfolds, participants judged the usefulness of information and the effectiveness of approaches. They make decisions between the conflicting choices and explain their reason. Scores were computed from these scenarios for changes in decision, usefulness of information and approaches, and resolution of conflicting choices. Participants also responded to open ended questions.

Cognition in Context

Material   Cognition in Context presents a vignette about opening a factory in the participant's country to measure six cultural dimensions: Analytic-Holistic thinking, Hypothetical-Concrete reasoning, Dialectical reasoning, Causal Attribution, Power Distance, and Uncertainty Avoidance. Following the vignette, fifty potential approaches were listed. Each of the six cultural dimensions was represented by 8 items, 4 supporting each end of a dimension, making a total of 48 items. The first two items were practice items. Directions asked participants to rate the approaches as important in their country.

An example of each item for each dimension is as follows: *"Analysis can overcome unexpected complications," "Change plans based on imagined outcomes," "Tell friends and relatives about your problem," "Workers expect to be told what to do", and "Settle on one option."* See Appendix I.

Procedure   Participants rate each item from 1 (Not Important) to 6 (Very Important). Each dimension was scored separately. Higher scores indicate support for holistic, concrete, high tolerance of uncertainty, high power distances, situational, and dialectical approaches.

2.3.4 Participant response characteristics and Demographics

Positive Affect Negative Affect Scale (PANAS)

Material   The PANAS measures affective respond tendency. It has 20 items describing different types of feelings; 10 were positive feeling items and 10 were

negative feeling items. For example, *"excited"* and *"alert"* are positive feeling items and *"upset"* and *"afraid"* are negative feeling items. See Appendix J.

Procedure   Participants rated each item from 1 (Very slightly or not at all) to 5 (Extremely) to describe the extent to which they experience in general each feeling item. A mean score for positive and for negative affect items were computed for each participant.

Impression Management Scale (IMS)

Material   IMS taps perceived social desirability of responding positively to certain items. It is a 16-item, self-report questionnaire. Items include eight implicit and eight explicit impression management items. For example, *"My first impressions of people usually turn out to be right"* is an implicit item and *"I never cover up my mistakes"* is an explicit item. See Appendix K.

Procedure   Participants read and rated each item from 1 (Strongly Disagree) to 5 (Strongly Agree). Mean scores for implicit and explicit impression management were computed.

Demographic Questionnaire

Material   This information sheet queried characteristics including age, academic major, years in school, native language, language used with parents, and place of birth. Participants were also asked about time outside of their country as well as their age when this occurred. This provided a description of the sample and allowed demographic analysis. See Appendix L.

Procedure   Participants were asked to provide the requested demographic information.

3. RESULTS: Main Groups

This section presents descriptive and statistical results for the measures describing the primary study groups. The section that follows reviews the exploratory group.

3.1 Primary Study Groups: Demographic Differences
Participants

Seven samples of undergraduate students, from China, India, Japan, Korea, Malaysia, US-UCB, and US-WSU were recruited from psychology classes. Potential participants were included only if they reported that their parents were native to the sample nation and that they had not lived away from their country for more than one (1) year. Also excluded were those who submitted incomplete data. In all, 202, 192, 212, 186, 183, 196 and 201 participants from China, India, Japan, Korea, Malaysia, US-UCB, and US-WSU, respectively were included in the analysis.

Family and Language Background. All participants had parents who were native to the national group under study. The Indian participants spoke Hindi, a variety of local Indian dialects, and English as the most common first language. All other participants spoke the language native to their nation as their first language. These demographics confirmed the placement of participants in the national samples.

Age. Participants were between 18 and 24 years of age. Table 1 below presents means and standard deviations for the samples. Throughout this report, we use Tukey's test comparisons in conjunction with Analysis of Variance (ANOVA) to describe sample mean differences.   An ANOVA shows age to be significantly different over samples, $F (6, 1365) = 126.88, p < .001$. Table 2, the Tukey's test comparison, shows that the Malaysian sample is the oldest with Korea and India following in that order. Their appearance in different columns shows that their ages differ significantly. The Chinese and US-UCB samples differ significantly from the Indian sample but not from each other and so appear in the same column. The Japanese sample is the youngest but appears in the same column as the US-WSU sample because they did not differ significantly from each other.

Table 1. Mean and Standard Deviation of Age

Age	China	India	Japan	Korea	Malaysia	US-UCB	US- WSU
N	202	192	212	186	183	196	201
Mean	19.87	20.80	19.08	21.37	21.86	20.08	19.09
SD	1.45	.99	1.22	1.58	1.38	1.40	1.26

Table 2. Age Groupings

Country	Subset for alpha = .05				
	1	2	3	4	5
Japan	19.08				
US-WSU	19.09				
China		19.87			
US-UCB		20.08			
India			20.80		
Korea				21.37	
Malaysia					21.86

Gender. No attempt was made to equate the numbers of males and females in each sample. The percent of males was 54.0, 85.9, 62.3, 48.9, 9.8, 25.4 and 31.6 for the Chinese, Indian, Japanese, Korean, Malaysian, US-UCB, and US-WSU samples, respectively. These differences were significant over the groups, χ^2 (6) = 298.92, $p < .001$, with the Indian sample having the most males and the Malaysian sample the least.

Academic major. The academic majors of participants varied significantly over samples, χ^2 (48) = 1534.33, $p < .001$, reflecting differences in university emphasis, degree requirements, and student choices. All Indian participants reported majoring in engineering, not surprising as students of a technical institution. See Table 3 below for complete reports.

Table 3. Percentage of Majors in Each Sample.

Majors	China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
N	180	192	204	184	178	181	196
Engineering	1.1	100.0	16.7	21.7	8.4	5.0	7.7
Social/Beh Sciences	22.8	.0	33.8	27.2	78.7	53.0	21.4
Natural Sciences	36.1	.0	4.4	15.8	.0	11.0	5.1
Business	14.4	.0	16.2	5.4	.6	6.6	12.2
Humanities/Fine Arts	15.0	.0	5.9	10.3	7.3	5.5	5.1
Education	.0	.0	2.9	9.8	.0	3.3	8.2
Health Sciences	2.8	.0	2.5	1.6	.0	3.9	33.7
Law	6.7	.0	17.2	3.8	.6	1.1	.0
Other	1.1	.0	.5	4.3	4.5	10.5	6.6

Year in School. Samples differed significantly in their distribution over year in school, χ^2 (18) = 683.18, $p < .001$. Three participants (2 Indians, 1 US-UCB) reported being in their 5th year of school, these were recorded as Year 4. See Table 4 below for sample compositions.

Table 4. Percentage of Years in School for Each Sample

Yrs in School	China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
N	190	189	212	186	183	196	201
Year 1	49.5	2.6	68.4	4.3	33.3	23.0	72.1
Year 2	33.7	1.1	19.3	31.2	16.9	15.3	20.4
Year 3	11.6	22.8	8.0	30.6	13.7	28.6	4.5
Year 4 or more	5.3	73.5	4.2	33.9	36.1	33.2	3.0

Summary: The participants in this study were members of their sample's culture and fit the criteria for inclusion. They differed in that the university samples had distinctive patterns of academic majors, year in school, and gender distribution.

3.2 Overview of Results

Table 5 lists the scales and measures along with F-values for the significance of the test in differentiating the national samples.

Table 5. Overview of Differences Among Samples

Type of Measures	Measures	F
Self-Report Scales	**Analytic-Holism Scale**	53.05**
	- Causality	39.46**
	- Attention	27.09**
	- Tolerance for Contradiction	46.55**
	- Perception of Change	8.84**
	Dialectical Thinking Inventory	
	- Tolerance for Contradiction	43.25**
	- Holism	34.95**
Microcognitive Measures	**Exclusion Test**	14.91**
	Word Association Test	85.88**
	Relevance of Facts	
	- Low Relevance Items	18.23**
	- High Relevance Items	29.47**
	- Dispositional Items	29.59**
	- Situational Items	17.38**
	Memory of Facts	
	- Low Relevance Items	25.57**
	- High Relevance Items	33.30**
	- Dispositional Items	40.67**
	- Situational Items	35.06**
Macrocognitive Measures	**Dynamic Cognition**	
	- Decision Stay	1.93
	- Decision Leave	5.62**
	- Exploratory Information	8.47**
	- Confirmatory-stay Information	21.88**
	- Confirmatory-leave Information	51.68**
	- Neutral Information	28.51**
	- Personal-Dispositional	12.40**
	- Personal-Situational	26.90**
	- Institutional-Situational	10.15**
	- Institutional-Dispositional	9.15**
	- Certainty in Approach	11.63**
	- Intermediate Approach	36.11**
	Cognition in Context	
	- Analytic-Holistic Thinking	17.98**
	- Causality	26.52**
	- Dialectical Reasoning	25.15**
	- Hypothetical Concrete	30.98**
	- Tolerance for Uncertainty	16.18**
	- Power Distance	56.59**
Manipulation Checks	**PANAS** - Positive Affect	47.59**
	- Negative Affect	49.95**
	IMS - Implicit	26.17**
	- Explicit	30.68**

** $p < .01$

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Summary: The measures show significant differences at the $p < 0.01$ level for the samples for 38 of 39 measures. These measures can differentiate the country samples and describe the cognitive and values characteristics of the individual countries. Because the Rosetta Battery measures microcognitive functions as well as macrocognitive functions, it is well positioned to bridge the gap between small units of cognition and differences in complex cognition such as problem identification, sensemaking, decision making, planning, and team work.

3.3 National Differences (Scales)

3.3.1 Analytic-Holism Scale (AHS)

The AHS accesses analytic-holistic thinking. The research literature suggests East Asians to be higher in Holism and Westerners higher in Analytic thinking. We expected the samples from China, Japan, and Korea to have higher scores and the U.S. samples lower scores overall and for Causality, Attention, Tolerance for Contradiction (ToC), and Perception of Change (PoC). As little previous data is available for the Indian and Malaysian samples no predictions were made. Means and standard deviations for AHS overall and the four subscales are reported in Table 6.

Table 6. Mean and Standard Deviation for Overall AHS and for the Subscales

AHS		China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
	N	202	192	212	186	183	196	201
Overall	Mean	4.91	4.88	4.92	5.08	5.39	4.75	4.65
	SD	.37	.47	.47	.41	.44	.50	.50
Causality	Mean	5.63	5.22	5.37	5.35	5.92	5.12	4.71
	SD	.72	.82	.95	.74	.74	.93	.93
Attention	Mean	4.91	4.90	4.83	5.36	5.29	4.76	4.42
	SD	.75	.95	.81	.74	.85	.88	.95
ToC	Mean	4.38	4.61	4.57	4.89	5.62	4.69	4.91
	SD	.69	.93	.80	.78	.66	.90	.86
PoC	Mean	4.70	4.77	4.92	4.74	4.71	4.43	4.55
	SD	.69	.78	.83	.69	.79	.78	.75

Overall Scores. Mean scores for overall AHS scores differed, $F(6, 1365) = 53.05$, $p < 001$. Malaysia showed the highest Holism. Tukey's groupings for AHS scores are found in Table 7. Note that US-USB differs significantly neither from US-WSU nor from India in Holism score.

Table 7. Overall: Mean of Holism Groupings

Country	N	Subset for alpha = .05				
		1	2	3	4	5
US-WSU	201	4.65				
US-UCB	196	4.75	4.75			
India	192		4.88	4.88		
China	202			4.91		
Japan	212			4.92		
Korea	186				5.08	
Malaysia	183					5.39

Causality. The samples differed on Causality, $F(6, 1365) = 39.46$, $p < .001$. Tukey's groupings for the Causality subscale are found in Table 8 below. Malaysia shows the most situational attribution; India was not statistically different from US-UCB or from China and Japan.

Table 8. Subscale: Mean of Causality Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
US-WSU	201	4.71			
US-UCB	196		5.12		
India	192		5.22		
Korea	186		5.35		
Japan	212		5.37		
China	202			5.63	
Malaysia	183				5.92

Attention. The Attention subscale showed sample differences overall, $F (6, 1365) = 27.09$, $p < .001$. The US-WSU sample scored the lowest indicating the least attention to context. Table 9 below provides the Tukey's groupings.

Table 9. Subscale: Means of Attention Groupings

Country	N	Subset for alpha = .05		
		1	2	3
US-WSU	201	4.42		
US-UCB	196		4.76	
Japan	212		4.83	
India	192		4.90	
China	202		4.91	
Malaysia	183			5.29
Korea	186			5.36

Tolerance for Contradiction. The Tolerance for Contradiction subscale differed significantly over samples, $F (6, 1365) = 46.55$, $p < .001$. The Malaysian sample reported the highest Tolerance for Contradiction. The Tukey's groupings are found in Table 10 below.

Table 10. Subscale: Mean of Tolerance for Contradiction Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
China	202	4.38			
Japan	212	4.57	4.57		
India	192	4.61	4.61		
US-UCB	196		4.69	4.69	
Korea	186			4.89	
US-WSU	201			4.91	
Malaysia	183				5.62

Perception of Change. Finally, scores for the Perception of Change subscale differed significantly over samples, $F (6, 1365) = 8.84$, $p < .001$. The US samples had the lowest score indicating the least belief in non-linear change. Japanese sample had the highest Perception of Change scores indicating the greatest belief. Table 11 provides Tukey's groupings.

Table 11. Subscale: Mean of Perception of Change Groupings

Country	N	Subset for alpha = .05		
		1	2	3
US-USB	196	4.43		
US-WSU	201	4.55	4.55	
China	202		4.70	4.70
Malaysia	183		4.71	4.71
Korea	186		4.74	4.74
India	192		4.77	4.77
Japan	212			4.92

Summary: The Analytic-Holism Scale measures the tendency towards analytic vs. holistic thinking overall and on four subscales. Consistent with past research, the two United States samples showed the highest analytic ratings overall and on three of the four subscales: Causality, Attention, and Perception of Change. This national pattern transcends university differences for the United States samples. Similarly, the three East Asian samples showed the highest holistic ratings overall and on these same subscales. The patterns for the Tolerance for the Contradiction subscale were mixed suggesting that different mechanisms may be involved. The Malaysian sample had the most extreme holism scores overall and on the Causality and Tolerance for Contradiction subscales. Their ratings for Attention and Perception of Change did not differ significantly from the highest Holism scores. The scores for the Indian group ranked third on overall Analytic-Holism, Causality, and Tolerance for Contradiction; fourth for Attention and sixth for Perception of Change. The Indian sample performance reveals a very different pattern from the one found in research with Westerners and East Asians. This suggests that different mechanisms are at work.

Past research has often grouped East Asian nations together as Holistic nations. Our earlier Rosetta work and some recently findings suggest that this may be an overgeneralization. In this study we see different patters for the three groups. These are differences that can be important for understanding the use of information and for optimizing inter-group interactions. Because Tolerance for Contradiction is important during negotiations and communication, it deserves additional attention. Practitioners may be able to use informational about this dimension to formulate more successful strategies.

Dialectical Thinking Inventory (DTI)

The Dialectical Thinking Inventory taps dialectic-differential reasoning. See Table 12 for DTI means and standard deviation. Because dialectical reasoning has been associated with holism and differential reasoning with analytic thinking, we expected the subscales scores, Holism and Contradiction, to be similar to those of AHS in that the U.S. samples would have lower subscales scores than would the East Asian samples. As little data exists for the Indian and Malaysian samples no predictions are made.

The *Holism* subscale for the seven samples differed significantly, $F(6, 1365) = 43.25$, $p < .001$ with China, Japan, and Korea showing the highest mean holism scores. The *Tolerance for Contradiction* (ToC) subscale, $F(6, 1365) = 34.95$, $p < .001$ showed significant differences over samples with Korea having the highest mean score. Table 13-14 for DTI subscales Tukey's groupings.

Table 12. Mean and Standard Deviation for Overall DTI and Subscale

DTI		China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
	N	202	192	212	186	183	196	201
Holism	Mean	3.57	3.17	3.56	3.49	3.35	3.38	3.27
	SD	.32	.29	.33	.30	.34	.33	.33
ToC	Mean	3.42	3.19	3.20	3.51	3.06	3.39	3.31
	SD	.38	.37	.39	.37	.27	.40	.35

Table 13. Subscale: DTI Holism Groupings

Country	Subset for alpha = .05			
	1	2	3	4
India	3.17			
US-WSU		3.27		
Malaysia		3.35	3.35	
US-UCB			3.38	
Korea				3.49
Japan				3.56
China				3.57

Table 14. Subscale: DTI Tolerance for Contradiction Groupings

Country	Subset for alpha = .05					
	1	2	3	4	5	6
Malaysia	3.06					
India		3.19				
Japan		3.21	3.21			
US-WSU			3.31	3.31		
US-UCB				3.39	3.39	
China					3.42	3.42
Korea						3.51

Summary: For the Holism scale China, Japan and Korea showed the most holism while India followed by US-WSU and Malaysia showed the most analytic scores. For Tolerance for

Contradiction, Korea and China were most tolerant while Malaysia, followed by India and Japan showed the least.

Finally, because the AHS and the DTI purport to measure the same constructs, we examined the interrelationships between AHS and the DTI measures for the overall scale and for the subscales. The Analytic-Holism Scale included subscales for Attention, Causality, Tolerance for Contradiction, and Perception of Change. For the Dialectical Thinking Inventory this research included subscales measuring Holism and Contradiction. See Table 15 for correlations between AHS and DTI outcomes.

The Holism component of DTI correlated with the overall AHS and with all components of AHS except Tolerance for Contradiction. DTI: Contradiction correlated with overall Holism score and with the Perception of Change component on AHS but did not correlate with the Contradiction component on AHS.

A different way to view this problem is to look at specific groups. For the AHS, Malaysians were the most holistic group but they were more analytic using DTI. For Tolerance for Contradiction, China and Japan were the least tolerant in AHS but the most in DTI. Clearly, the construct of Analytic – Holistic requires additional attention. For the remaining analyses between the relationship of AH thinking and other measures, we used AHS scores. See Appendix M for AHS prediction. We selected the AHS because of its longer research history and the more comprehensive scales. The discrepancies between the two scales are intriguing. Our next step will be a detailed item analysis to identify patters of correlations.

Table 15. Correlations between AHS and DTI: Overall and Subscales

	AHS: Mean Holism	AHS: Mean Perception of Change	AHS: Mean Causality	AHS: Mean Attention	AHS: Mean Contradiction	DTI: Mean Contradiction	DTI: Mean Holism
AHS: Mean Holism	1						
AHS: Mean Perception of Change	0.27**	1					
AHS: Mean Causality	0.73**	0.02	1				
AHS: Mean Attention	0.65**	-0.15**	0.34**	1			
AHS: Mean Contradiction	0.62**	-0.12**	0.26**	0.25**	1		
DTI: Mean Contradiction	0.06*	0.13**	0.05	-0.04	0.01	1	
DTI: Mean Holism	0.27**	0.16**	0.31**	0.12**	0.04	0.30**	1

3.4 National Differences (Tasks)

3.4.1   Exclusion Task (Amount of information)

The Exclusion Task tapped Analytic vs. Holistic reasoning in the context of a mystery scenario. Those who use holistic reasoning were expected to exclude fewer items because they attended to the relatedness of broader information while analytic thinkers were expected to exclude more. Mean exclusion rates, the number of items excluded, and their standard deviations are presented in Table 16 below. The seven samples differed overall, $F (6, 1365) = 14.91$, $p < .001$. See Table 17 for Exclusion Task Tukey's groupings.

Table 16. Mean and Standard Deviation of Exclusion Task scores

Exclusion	China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
N	202	192	212	186	183	196	201
Mean	43.43	50.41	42.77	42.46	47.33	48.13	52.28
SD	15.33	12.47	15.21	14.93	14.00	14.61	12.80

Table 17. Exclusion Task Groupings

Country	Subset for alpha = .05			
	1	2	3	4
Korea	42.46			
Japan	42.77			
China	43.43	43.43		
Malaysia		47.33	47.33	
US-UCB			48.13	48.13
India			50.41	50.41
US-WSU				52.28

Summary: The lower exclusion rates reflect the wider range of information incorporated by participants in the Japan, Korea, and China samples. The performance of the East Asian groups confirms their more holistic reasoning. The higher exclusion rates from the U.S. samples reflect more analytic reasoning. Results from the Indian sample suggest analytic reasoning. Because the participants were engineering majors, additional work would need to confirm that the finding is cultural rather than professional in origin. Finally, the Malaysian sample showed a more analytic response pattern than did Korea and Japan and a less analytic pattern than US-WSU. The sample did not differ significantly from these four groups suggesting an intermediate reasoning pattern.

While the outcomes of this measure explore the same concept as the AHS and DTI, the measure itself is more naturalistic and less 'test-like' for participants to use. Participants tend to consider it an interesting exercise. It may be a more comfortable approach to measurement for uneasy participants.

3.4.2 Relevance of Facts (ROF)

This measure assesses how participants evaluate information relevance. Participants first decide if items are relevant to a scenario and then they judge the degree of relevance. Items varied in Attribution (Dispositional vs. Situational) and in Relevance (Low vs. High). We expected Analytic compared to Holistic thinkers, to judge fewer items, both dispositional and situational as relevant, to judge fewer situational than dispositional items as relevant, and to judge fewer less than more relevant items as relevant. Data was unavailable for India and Malaysia so no predictions were made. Analyses excluded the US-UCB sample due to data entry problems.

ROF: 'If Relevant'

To evaluate the role of nation, we carried out a 3-way ANOVA for Country, Attribution types, and Relevance. See Table X for results. The significant 3-way ANOVA looked at the effects of Country (6) X Attribution types (2) X Relevance (2) for items picked as relevant. This interaction was significant, Pillai's Trace = .108, Wilk's Lamda = .89, F (5, 1163) = 28.26, $p <$ .001 indicates that the countries differ in their selection of 'If Relevant' items by attribution type. The graphs below show the 3-way interaction of high and low relevant items. See Figure 1. The Country main effect across the two types of items was also significant, F (5, 1163) = 24.99, $p <$ .001.
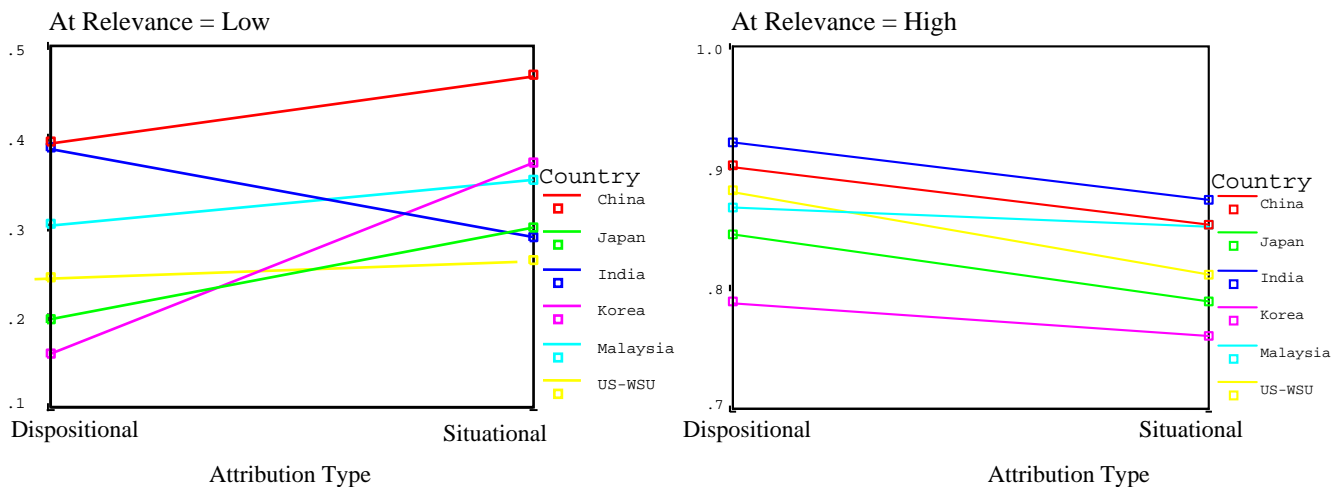
Figure 1.

Based on the 3-way interaction, we looked at the 2-way interactions for Country X Relevance and for Country X Attribution Types. The significant 2-way Country X Relevance interaction showed that the selection of items by country depended on the relevant of the items (see Figure 2 in Appendix N). A Tukey's test of group means presents the low relevance and high relevance items by country. See Table 18 and 19 below for Selection of Relevance item groupings.

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Table 18. Low Relevance Items selected Groupings

Country	N	Subset		
		1	2	3
Japan	212	0.25		
US-WSU	201	0.25		
Korea	186	0.27	0.27	
Malaysia	183		0.33	
India	192		0.34	
China	195			0.43

Table 19. High Relevance Items selected Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Korea	186	0.77			
Japan	212		0.82		
US-WSU	201		0.85	0.85	
Malaysia	183			0.86	
China	195			0.88	0.88
India	192				0.90

The main effect for Relevance indicates that participants overall selected High relevance items and Low relevance items differently, $F (1, 1163) = 7269.30$, $p < .001$. Participants also selected more high relevant items than low, $Mdiff = .51$, $t (1349) = 73.11$, $p < .001$.

Finally, we found a significant interaction of Country X Attribution types $F (5, 1163) = 24.53$, $p < .001$ indicating that countries varied in selections based on Attribution type (see Figure 3 in Appendix N). This interaction can be seen in the Tukey's test groupings for dispositional and situational items by country. See Table 20 and 21 below. The main effect for Attribution type was not significant. This indicates that there is no evidence that participants differentiated dispositional from situational item in their selections.

Table 20. Dispositional Items Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Korea	186	0.42			
Japan	212	0.47	0.47		
US-WSU	201		0.52	0.52	
Malaysia	183			0.53	
China	195				0.60
India	192				0.61

Table 21. Situational Items Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
US-WSU	201	0.47			
Japan	212	0.49			
Korea	186	0.51	0.51		
India	192	0.52	0.52		
Malaysia	183		0.54	0.54	
China	195				0.62

Summary: For "If Relevant' the 3-way interaction was significant as were the two-way interactions for Country X Relevance and Country X Attribution Types. The main effects of Country and of Relevance were significant but the main effect of Attribution type was not. National groups differ in how they judge items based on attribution and relevance. The samples judged the items differently as a function of Dispositional vs. Situational Attribution and of Low or High relevance. China selected both dispositional and situational items as most relevant. They also selected the most high and low relevant items as relevant. While Japan selected the least on all types of items except high relevant items. US-WSU as expected selected the least low relevant items and situational items.

Judged relevance is important for complex cognition in that people face a stream of information far beyond human capacity to retain. People must constantly scan incoming information and select the information most relevant to their goals. The outcomes of this research demonstrate that judgments of relevance vary by national group. Those groups expected to show more analytic reasoning, generally showed patterns consistent with this cognition. These differences contribute to difficulties in interactions and in anticipation. Knowledge of the relevance judgment of a business or host nation can help provide information in a more effective form. This supports the potential utility of the dimension for predicting and supporting the choices during intercultural interchanges.

3.4.3   Memory of Facts (What Information is Recalled)

Memory is an indicator of perceived relevance and establishes the availability of information for later use. The Memory of Facts elicits items recalled of the 14 item accident scenario items of the *Relevance of Facts* task. For each participant, recalled and absent items were scored.

Items recalled varied by Attribution types (Dispositional vs. Situational) and by Relevance (Low vs. High). We wanted to know if these characteristics influenced recall across groups. We expected that Analytic thinkers would remember fewer situational and fewer low relevant items than would holistic thinkers. We expected that Holistic thinkers would recall more situational and more low relevant items than would the analytic thinkers.

A three-way ANOVA of memory for facts for Country (6) X Attribution types (2) X Relevance (2) found significant differences among countries by items types. See Figure 4. This interaction was significant, Pillai's Trace = .024, Wilk's Lamda = .98, F (6, 1358) = 5.59, $p < .001$ The graphs below show the 3- way interaction at high and low relevant items recall. The Country main effect across the two types of items was also significant, F (6, 1358) = 29.24, $p < .001$.
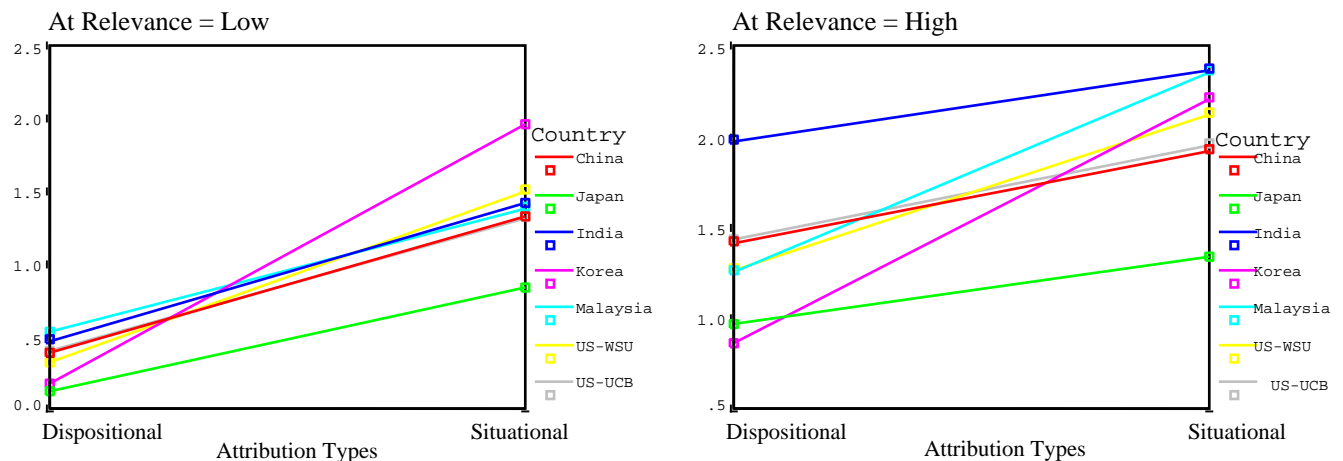
Figure 4.

Based on the 3-way interaction for recall, we looked at the two-way interactions for Country X Relevance and Country X Attribution Types. The Two-way ANOVAs and main effects below detail these relationships.

Country by Relevance. The two-way ANOVA for country X relevance found a significant interaction of country by Relevance F (6, 1358) = 15.62, $p < .001$ indicating that recall for groups varied with the relevance of items (see Figure 5 in the Appendix N). Tukey's test of grouped means or recall shows high relevance and low relevance by country. See Tables 22 and 23 below for high and low relevance item groupings.

Table 22. High Relevance Items Recalled Groupings

Country	N	Subset			
		1	2	3	4
Japan	212	2.31			
Korea	186		3.07		
China	195		3.34	3.34	
US-UCB	196		3.39	3.39	
US-WSU	201		3.40	3.40	
Malaysia	183			3.62	
India	192				4.35

Table 23. Low Relevance Items Recalled Groupings

Country	N	Subset		
		1	2	3
Japan	212	0.96		
China	195		1.71	
US-UCB	196		1.72	
US-WSU	201		1.83	1.83
India	192		1.90	1.90
Malaysia	183		1.92	1.92
Korea	186			2.13

Finally, the main effect for Relevance was significant indicating participants remembered High and Low relevance items differently, F (6, 1358) = 1394.57, $p < .001$. Participants also remembered more high relevant items than low, $Mdiff = 1.61$, t (1364) = 36.20, $p < .001$.

The two-way ANOVA for country X attribution type showed a significant country by attribution interaction F (6, 1358) = 31.82, $p < .001$ indicating that groups differed in their recall of items depending on Attribution type (see Figure 6 in the Appendix N). See Table 24 and 25 for the Tukey's test groupings for the recall of Dispositional and of Situational items.

Table 24. Dispositional Items Recalled Groupings

Country	N	Subset		
		1	2	3
Korea	186	1.03		
Japan	212	1.09		
US-WSU	201		1.59	
Malaysia	183		1.79	
China	195		1.80	
US-UCB	196		1.83	
India	192			2.45

Table 25. Situational Items Recalled Groupings

Country	N	Subset			
		1	2	3	4
Japan	212	2.18			
China	195		3.26		
US-UCB	196		3.28	3.28	
US-WSU	201		3.64	3.64	
Malaysia	183		3.75	3.75	3.75
India	192			3.79	3.79
Korea	186				4.17

The main effect for Attribution type is significant indicating participants remember dispositional and situational items differently, $F(6, 1358) = 1518.99$, $p < .001$. Participants remembered more situational items than dispositional items, $Mdiff = -1.77$, $t(1364) = -36.26$, $p < .001$.

Summary: Memory for facts provides a sensitive predictor of amount and kind of information available by groups. The Japan sample had the lowest recall of both relevant and attribution items. This pattern is consistent with the items selection in Relevance of Facts. The Korean sample recalled the lowest number of dispositional items and the highest number of situational items. The findings for situational information are consistent with earlier research. India, however, showed a different pattern. They recalled the highest number of dispositional items and the second highest situational items. Their recall may well reflect memory independent of attribution type. The emerging picture confirms most of the outcomes of the Relevance of Facts task but inconsistent outcomes are noted.

The Memory for Facts measure carries one unfortunate demand. Because it asks for qualitative responses, the data must be coded. This process is time consuming and potentially inaccurate particularly when scoring guides must be prepared in multiple languages. Unfortunately, our results may also reflect scoring differences across research teams. These limitations hamper its future use.

3.4.4   Word Association Test (WAT)

The Word Association Test taps the of use rule-based categories vs. relationship-based categories (Norenzayan et al., 2002). Analytic thinkers were expected to favor categorizations based on rule-based attributes while holistic thinkers were expected to favor relationship-based categories. Based on earlier research, we expected the U.S. samples to have higher Word Association Test scores and the East Asian samples lower. The WAT score is the sum of rule-based categorization. High scores indicate rule-based selections.

Mean scores for the groups differed overall, F (6, 1365) = 85.57, $p < .001$. See Table 26 below for mean and standard deviation of WAT score and Table 27 for Tukey's groupings for the results.

Table 26. Mean and Standard Deviation of WAT scores

WAT	China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
N	202	192	212	186	183	196	201
Mean	.46	.21	.62	.34	.23	.24	.19
SD	.29	.23	.26	.27	.23	.22	.21

Table 27. WAT Scores Groupings

Country	Subset for alpha = .05			
	1	2	3	4
US-WSU	0.19			
India	0.21			
Malaysia	0.23			
US-UCB	0.24			
Korea		0.34		
China			0.46	
Japan				0.62

Summary: The three East Asian samples differed significantly from each other and showed significantly higher scores than did the other groups. This was contrary to predictions as it reflects rule-based rather than rule-based classifications.

One possible explanation seems likely. Past research confirms that educated people can usually respond in both analytic and holistic modes even while retaining their preferred mode. In particular, tasks considered personal call forth more holistic thinking while tasks viewed as 'cognitive' call forth more analytic reasoning. As we reviewed the material, we note that the title of the task is the Word Association Test and the instruction reiterates the term "test". It is possible that the repeated appearance of the word 'test' primed the more analytic mode. To interpret the present outcomes would require additional attention. The priming of analytic vs. holistic itself suggests interesting interventions.

3.5 National Differences (Complex Cognition)

3.5.1 Dynamic Cognition

During challenging events, people seek and select information in order to make sense of new circumstances, to make decisions, and to plan. To anticipate the actions of allies and competitors, we need to know what information they favor in making decisions and planning. The Dynamic Cognition Task accesses differences in information use during decision making in two naturalistic scenarios. The first scenario, *The Chemistry Class*, assessed importance of information type during sense making in a potentially dangerous situation. The second scenario, *The Business Meeting*, assessed the judged usefulness of information based on its source and certainty in the context of an important business meeting.

Chemistry Class

Participants read the scenario and decided if they would stay or leave. They then reviewed additional information and decided the likelihood that they would change their decision based on the information presented. Change scores were used for analysis. Table 28 provides means and standard deviations for the outcome measures.

While the samples did not differ significantly in how new information would influence their decision to stay, they did differ in how the new information would change their decision to leave, F (6, 1350) = 5.62, $p < .001$. See Table 29 for Tukey's groupings for the results.

The samples also differed in the rated importance of exploratory, confirmatory-stay, confirmatory-leave, and neutral information. The seven samples differed overall, in their appraisal of the exploratory items, F (6, 1365) = 8.47, $p < .001$. There were significant differences for confirmatory–stay, F (6, 1365) = 21.88, $p < .001$; confirmatory –leave, F (6, 1365) = 51.68, $p < .001$, and neutral information, F (6, 1365) = 28.51, $p < .001$. Tables 30-33 provide Tukey's groupings for decisions to stay or leave and for their assessment of information.

Table 28. Mean and Standard Deviation for Chemistry Class Outcome Scores

Dyn Cog		China	India	Japan	Korea	M'sia	US-UCB	US-WSU
Decision Stay	N	199	188	212	186	181	196	201
	Mean	0.12	-0.15	-0.22	-0.16	-0.04	-0.04	-0.26
	SD	1.06	1.54	1.49	1.09	1.40	1.33	1.19
Decision Leave	N	196	186	212	186	180	196	201
	Mean	-0.15	-0.48	0.13	0.18	-0.11	-0.07	0.06
	SD	1.20	1.60	1.41	0.86	1.51	1.12	1.17
Exploratory	N	202	192	212	186	183	196	201
	Mean	4.44	4.42	4.48	3.90	4.60	4.60	4.61
	SD	1.14	1.17	1.24	1.23	1.22	1.13	1.17
Confirm Stay	N	202	192	212	186	183	196	201
	Mean	5.28	4.16	4.79	4.66	4.76	4.50	4.53
	SD	0.93	1.09	1.14	0.88	1.10	1.02	0.97
Confirm Leave	N	202	192	212	186	183	196	201
	Mean	4.88	4.92	4.76	5.05	4.42	5.98	5.73
	SD	0.97	1.23	1.29	0.94	1.27	0.78	0.92
Neutral	N	202	192	212	186	183	196	201
	Mean	3.91	3.19	3.55	2.93	4.12	3.18	3.21
	SD	1.20	1.20	1.09	0.89	1.25	1.13	1.04

Table 29. Change: Decision to Leave Groupings

Country	N	Subset for alpha = .05	
		1	2
India	186	-0.48	
China	196	-0.15	-0.15
Malaysia	180	-0.11	-0.11
US-UCB	196		-0.07
US-WSU	201		0.06
Japan	212		0.13
Korea	186		0.18

Table 30. Exploratory Info Groupings

Country	N	Subset for alpha = .05	
		1	2
Korea	186	3.90	
Japan	212		4.42
China	202		4.44
India	192		4.48
Malaysia	183		4.60
US-UCB	196		4.60
US-WSU	201		4.61

Table 31. Confirm Stay Info Groupings

Country	N	Subset for alpha = .05		
		1	2	3
India	192	4.16		
US-UCB	196		4.50	
US-WSU	201		4.53	
Korea	186		4.66	
Malaysia	183		4.76	
Japan	212		4.79	
China	202			5.28

Table 32. Confirm Leave Info Groupings

Country	N	Subset for alpha = .05		
		1	2	3
Malaysia	183	4.42		
Japan	212		4.76	
China	202		4.88	
India	192		4.92	
Korea	186		5.05	
US-WSU	201			5.73
US-UCB	196			5.98

Table 33. Neutral Info Groupings

Country	N	Subset for alpha = .05		
		1	2	3
Korea	186	2.93		
US-UCB	196	3.18		
India	192	3.19		
US-WSU	201	3.21		
Japan	212		3.55	
China	202			3.91
Malaysia	183			4.12

Summary: We found group differences how the participants valued the types of information. While the samples differed in how participants valued information related to the decision to stay, the information did not alter their decisions. Participants did vary in the importance placed on information that supported a decision to leave as reflected in their eventual judgment. The Korean sample showed the lowest need for exploratory information; the other six samples rated exploratory higher and did not differ from each other. Here as with the decision to leave, the general tendency was to value information when it supported action. The confirming stay, confirming leave, and exploratory data also varied over the samples.

The differing patterns of preferred support suggest the importance of matching the information presented during negotiations, planning, and communication with the cognition of the recipient of the information. This has important implication for applied setting and will be explored further in the Discussion Section.

Business Meeting

Participants read a scenario describing high stakes decisions that had to be made under time-pressure and risk. They then judged the value given to personal vs. institutional information and to dispositional vs. situational information. Four types of information were presented: Personal-Dispositional, Personal-Situational, Institutional-Situational, and Institutional-Dispositional. Finally, participants indicated their preference for outcome that was relatively certain vs. those that balanced risk with advantage. The means and standard deviations of outcomes measures are provided in Table 34 below.

Table 34. Mean and Standard Deviation for Business Meeting Outcome Scores

Dynamic Cognition		China	India	Japan	Korea	M'sia	US-UCB	US-WSU
	N	202	191	212	186	183	196	201
Personal-Dispositional	Mean	5.05	4.94	4.23	4.67	4.76	4.63	4.35
	SD	1.11	1.17	1.29	1.04	1.18	1.23	1.25
Personal-Situational	Mean	4.03	3.74	4.35	4.25	4.08	3.63	2.94
	SD	1.24	1.33	1.39	1.10	1.39	1.34	1.33
Institutional-Situational	Mean	4.32	3.92	4.49	3.81	4.54	3.97	4.01
	SD	1.27	1.38	1.25	1.08	1.42	1.34	1.29
Institutional-Dispositional	Mean	5.60	5.00	5.19	5.38	5.58	5.31	5.04
	SD	1.08	1.13	1.18	0.94	1.20	1.11	1.06
Certainty	Mean	3.18	3.13	3.73	3.37	3.67	3.80	3.93
	SD	1.18	1.23	1.32	1.31	1.52	1.29	1.29
Intermediate	Mean	4.68	4.35	3.62	4.20	4.15	3.86	3.60
	SD	0.76	0.96	1.06	0.84	1.00	0.92	0.99

The samples differed in their judgments of the usefulness of information for all four item types: Personal-Dispositional items, $F(6, 1364) = 12.40$, $p < .001$, Personal-Situational items, $F(6, 1364) = 26.90$, $p < .001$, Institutional-Situational items, $F(6, 1364) = 10.15$, $p < .001$, and Institutional-Dispositional items, $F(6, 1364) = 9.15$, $p < .001$. See Tables 35-38 for Tukey's groupings.

Table 35. Personal-Dispositional Source Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Japan	212	4.23			
US-WSU	201	4.35	4.35		
US-UCB	196		4.63	4.63	
Korea	186		4.67	4.67	
Malaysia	183			4.76	4.76
India	191			4.94	4.94
China	202				5.05

Table 36. Personal-Situational Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
US-WSU	201	2.94			
US-UCB	196		3.63		
India	191		3.74	3.74	
China	202			4.03	4.03
Malaysia	183			4.08	4.08
Korea	186				4.25
Japan	212				4.35

Table 37. Institutional-Situational Groupings				
Country	N	Subset for alpha = .05		
		1	2	3
Korea	186	3.81		
India	191	3.92		
US-UCB	196	3.97	3.97	
US-WSU	201	4.01	4.01	
China	202		4.32	4.32
Japan	212			4.49
Malaysia	183			4.54

Table 38. Institutional-Dispositional Groupings				
Country	N	Subset for alpha = .05		
		1	2	3
India	191	5.00		
US-WSU	201	5.04		
Japan	212	5.19	5.19	
US-UCB	196	5.31	5.31	5.31
Korea	186		5.38	5.38
Malaysia	183			5.58
China	202			5.60

The Business Meeting scenario also tapped the value placed on the certainty and on the balance of approaches. The samples placed different value on a certain approach, $F (6, 1364) = 11.63$, $p < .001$, and an intermediate or 'middle ground' approach, $F (6, 1364) = 36.11$, $p < .001$. See Table 39 for means and stand deviations. Table 39-40 provides Tukey's groupings for the Certainty and the Intermediate approaches respectively.

Table 39. Certainty in Approach Groupings				
Country	N	Subset for alpha = .05		
		1	2	3
India	191	3.1309		
China	202	3.1757		
Korea	186	3.3737	3.3737	
Malaysia	183		3.6749	3.6749
Japan	212		3.7288	3.7288
US-UCB	196			3.8036
WSU	201			3.9303
Sig.		.522	.102	.458

Table 40. Intermediate Approach Groupings				
Country	N	Subset for alpha = .05		
		1	2	3
US-WSU	201	3.6028		
Japan	212	3.6242		
US-UCB	196	3.8639		
Malaysia	183		4.1530	
Korea	186		4.2025	
India	191		4.3517	
China	202			4.6832
Sig.		.085	.355	1.000

Summary: The value placed on types of information varied across groups. All of the groups rated Institutional-Dispositional information as highest in value in decision making. Five of the samples, China, India, US-WSU, and US-USB, indicated Personal–Situational information as least valuable. The lowest rating for the Japanese sample was Personal–Situational and the lowest for Korea was Institutional–Situational.

The samples also varied in their preference for certainty and for intermediate approaches. The certain approach is consistent with analytic thinking in that it implies a 'correct' choice. The two U.S samples were the most favorable to certain approaches with Japan and Malaysia not differing significantly from them. The Intermediate approach is most consistent with the holistic thinking pattern where contradictions are accepted. India, China, and Korea least favored the certain approach and ranked higher on the intermediate approaches. These are consistent with a holistic position that many paths can be correct. US-WSU, Japan, and US-UCB were the least favorable to the intermediate approaches. This is consistent with their analytic position in which one option is correct at the exclusion of others. The types of items deemed important varied among the groups as they worked through the scenarios. This is likely to contribute to situational appraisal, decision making, and planning in naturalistic contexts.

3.5.2   Cognition in Context

The Cognition in Context task borrows six dimensions from the cultural research literature: Analytic-Holistic thinking, Causality (Attribution), Dialectical -Differential reasoning, Hypothetical-Concrete reasoning, Tolerance of Uncertainty (uncertainty avoidance), and Power Distance. Means and Standard deviations for these variables are found in Table 41. Based on earlier work, the U.S. samples were expected to be more analytic and hypothetical in thinking and more tolerance of uncertainty; they were expected to show lower power distance and less situational and dialectical thinking.

Table 41. Mean and Standard Deviation for Cultural Dimensions

DTI		China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
	N	202	192	212	186	183	196	201
A-H	Mean	3.23	3.30	3.15	3.36	3.00	3.30	3.26
	SD	.42	.41	.39	.41	.37	.36	.37
Cau	Mean	3.54	3.34	3.35	3.65	3.28	3.07	3.10
	SD	.60	.61	.57	.56	.40	.61	.60
D-D	Mean	3.62	3.97	3.68	3.44	4.03	4.01	3.80
	SD	.60	.59	.55	.59	.68	.60	.66
H-C	Mean	2.88	3.32	3.38	2.97	3.24	3.19	3.32
	SD	.52	.60	.56	.47	.33	.43	.40
TU	Mean	3.75	3.52	3.50	3.86	3.72	3.64	3.68
	SD	.46	.46	.52	.36	.37	.41	.47
PD	Mean	2.78	3.62	3.29	2.85	3.39	3.39	3.40
	SD	.61	.59	.67	.59	.48	.56	.53

The seven groups differed overall for all six variables: analytic-holistic (A-H) (F (6, 1365) = 17.98, $p < .001$); Causality (CAU), F (6, 1365) = 26.52, $p < .001$; Dialectical Reasoning, F (6, 1365) = 25.15, $p < .001$; Hypothetical-Concrete (H-C) Thinking, F (6, 1365) = 30.98, $p < .001$; Power Distance (PD), F (6, 1365) = 56.59, $p < .001$; and Tolerance of Uncertainty (TU) (F (6, 1365) = 16.18, $p < .001$). See Table 42-47 for Tukey's grouping for the six variables. Table 48 shows Hofstede's values.

Table 42. Analytic-Holistic Thinking Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Malaysia	183	3.00			
Japan	212		3.15		
China	202		3.23	3.23	
US-WSU	201		3.27	3.27	3.27
US-UCB	196			3.30	3.30
India	192			3.30	3.30
Korea	186				3.36

Analytic---Holistic

Table 43. Causality Groupings

Country	N	Subset for alpha = .05		
		1	2	3
US-UCB	196	3.07		
US-WSU	201	3.10		
Malaysia	183		3.28	
India	192		3.34	
Japan	212		3.35	
China	202			3.54
Korea	186			3.65

Dispositional------------------------------Situational

Table 44. Dialectical-Differentiation Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Korea	186	3.44			
China	202	3.62	3.62		
Japan	212		3.68		
US-WSU	201		3.80	3.80	
India	192			3.97	3.97
US-UCB	196				4.01
Malaysia	183				4.03

Differentiation---Dialectical

Table 45. Hypothetical-Concrete Reasoning Groupings

Country	N	Subset for alpha = .05		
		1	2	3
China	202	2.88		
Korea	186	2.97		
US-UCB	196		3.19	
Malaysia	183		3.24	3.24
US-WSU	201		3.32	3.32
India	192		3.32	3.32
Japan	212			3.38

Hypothetical----------------------------------Concrete

Table 46. Tolerance of Uncertainty Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Japan	212	3.50			
India	192	3.52	3.52		
US-UCB	196		3.64	3.64	
US-WSU	201			3.68	
Malaysia	183			3.72	
China	202			3.75	3.75
Korea	186				3.86

Low TU---High TU

Table 47. Power Distance Groupings

Country	N	Subset for alpha = .05		
		1	2	3
China	202	2.78		
Korea	186	2.85		
Japan	212		3.29	
Malaysia	183		3.39	
US-UCB	196		3.39	
US-WSU	201		3.40	
India	192			3.62

Low PD--------------------------------------High PD

Table 48. Hofstede's Index

Country	Uncertainty Avoidance	Power Distance
China	30	80
India	40	77
Japan	92	54
Korea	85	60
Malaysia	36	104
United States	46	40

Summary: This research shows the East Asian samples to prefer situational causality and dialectical reasoning while the US samples showed dispositional causality and differential reasoning. These are expected findings. The other expectations were only "partially" supported. The U.S. samples had higher scores on concrete, tolerance of uncertainty, and power distance. The outcomes support the view that it may not simply be 'culture' patterns that are important but rather a complex interplay with several methodological features.

3.6 National Differences (Response Characteristics)

3.6.1 Positive and Negative Affect Scale (PANAS)

PANAS taps affective responses patterns and was included to tap individual differences that might help explain or expand on the results. Outcomes for the samples differed for both Positive affect, $F (6, 1365) = 47.59, p < .001$ and Negative Affect, $F (6, 1365) = 49.95, p < .001$. The Korean sample reported both the highest positive and highest negative affect. Japan reported the lowest positive affect and was in the highest negative affect grouping. See Table 49 for PANAS means and standard deviations. Tables 50-51 show Tukey's mean groupings.

Table 49. Mean and Standard Deviation for PANAS

PANAS		China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
	N	202	192	212	186	183	196	201
Positive	Mean	3.27	3.75	3.06	3.94	3.71	3.42	3.54
	SD	.61	.56	.70	.60	.48	.57	.73
Negative	Mean	2.33	2.36	2.95	2.97	2.90	2.29	2.08
	SD	.75	.70	.75	.87	.76	.66	.69

Table 50. Average Positive Affect Groupings

Country	N	Subset for alpha = .05					
		1	2	3	4	5	6
Japan	212	3.06					
China	202		3.27				
US-UCB	196		3.42	3.42			
US-WSU	201			3.54	3.54		
Malaysia	183				3.71	3.71	
India	192					3.75	
Korea	186						3.94

Table 51. Average Negative Affect Groupings

Country	N	Subset for alpha = .05		
		1	2	3
US-WSU	201	2.08		
US-UCB	196	2.29	2.29	
China	202		2.33	
India	192		2.36	
Malaysia	183			2.90
Japan	212			2.95
Korea	186			2.97

Summary: Korea showed the most positive affect followed by India and Malaysia while Japan showed the least positive affect. Korea also showed the most negative affect along with Japan and Malaysia. The U.S. samples showed the least negative affect. The Korean sample outcomes reflected the most extreme scores for both positive and negative affect while the Japanese sample reported the lowest positive affect and second highest negative affect.

The PANAS measure taps dimension that presents a recurring problem during intercultural interchange. Americans have cultural rules for affect expression and they use these rules to interpret the affect of others. When the cultural rules differ, Americans are likely to misunderstand the intent of the speaker. Americans are also likely to be 'mistranslated' if they do not know how to adopt their own affective to the affective convention of the recipients of their communication.

3.6.2 *Impression Management Scale* (IMS)

The IMS tapped another individual response characteristic. The seven samples differed for both implicit, $F (6, 1365) = 26.17$, $p < .001$ and explicit impression management, $F (6, 1365) = 30.68$, $p < .001$. Means and Standard Deviations are reported in Table 52 while Tukey's groupings can be found in Tables 53 and 54. A higher score indicates more implicit and higher explicit impression management.

Table 52. Mean and Standard Deviation for IMS

IMS		China	India	Japan	Korea	Malaysia	US-UCB	US-WSU
	N	202	192	212	186	183	196	201
Implicit	Mean	2.80	2.97	2.81	2.42	2.93	2.68	2.87
	SD	.50	.52	.42	.49	.49	.53	.55
Explicit	Mean	2.94	2.75	2.99	2.59	2.50	2.56	2.74
	SD	.46	.50	.40	.48	.51	.50	.57

Table 53. Mean of Implicit Groupings

Country	N	Subset for alpha = .05			
		1	2	3	4
Korea	186	2.42			
US-UCB	196		2.68		
China	202		2.80	2.80	
Japan	212		2.81	2.81	
US-WSU	201			2.87	2.87
Malaysia	183			2.93	2.93
India	192				2.97

Table 54. Mean of Explicit Groupings

Country	N	Subset for alpha = .05		
		1	2	3
Malaysia	183	2.50		
US-UCB	196	2.56		
Korea	186	2.59		
US-WSU	201		2.74	
India	192		2.75	
China	202			2.94
Japan	212			2.99

Summary: The participants from India, Malaysia and US-WSU reported the most implicit impression management while the Korean participants reported the least. In contrast, Japanese and Chinese participant's responses reflected the most explicit impression management, while Malaysia, US-UCB and Korea showed the least. As with affect, impression management is a cultural convention understood within a culture. It helps define presentation rules and it allows other within the culture to extract the intended verbal message from an utterance. During intercultural interchanges, communication is most effective when this cultural difference can be breached. This is an appropriate target for training.

4. RESULT: Exploratory Study Groups

Most cross-cultural research has investigated Western and East Asians participants. The reason for this is pragmatic rather than conceptual. Many East Asians researchers have trained in Western universities and returned to their home nations to pursue their research careers. They have used rigorous research expertise to collect data and to extend theoretical models. Their contributions have added much to the field. This concentration on the West and East Asia has, however, distorted our understanding of cultural differences. It is easy to assume that Western and East Asian characteristics alone are enough to span cultural differences.

The current research has pushed the envelope to include participants from Indian and Malaysian, less studied groups were included with the main samples. This exploratory study included Indonesian and Arabic-language participants to investigate cognitive difference in these groups. The goal was three fold: 1.) To provide initial measures of cognition for Indonesian and Arabic-language speaking participants, two important but less unstudied groups; 2.) To provide initial comparisons of the cognition of the two exploratory groups with the seven main groups; and 3.) To provide an initial description of the commonality shared by the three Islamic samples: the two exploratory groups and the Malaysian group.

The inclusion of three Islamic samples is an important opportunity. As followers of the same religions tradition, the Indonesian and Arabic language speaking groups might be assumed to show cognitive commonality with the Malaysian group. The Malaysian and Indonesian samples, having considerable ecological, social, ethnic, and political commonality might be assumed to share cognitive processes. We look at the relative strength of these influences on the patterns of cognition.

The large difference in sample sizes between the main and exploratory samples precluded a definitive comparison of the main and exploratory samples. Further, differences in the educational standing of the Arabic sample, many graduate students, cautions against giving more than exploratory credence to the outcomes. Rather, the data suggests the relative placement of these samples with respect to the larger samples and provides a starting point for understanding influences on cognition and for planning additional research.

Participants

Two samples of undergraduate students from the International Islamic University Malaysia (IIUM) served as participants. The first sample included thirty students, aged between 17 and 24 years, whose native country was Indonesia and who completed all research material in the Indonesian language. One participant did not provide age data. There were 18 female and 12 male. Eighty percent (80%) of the students majored in social or behavioral sciences, 10% in engineering, while the rest majored humanities, arts and law or did not indicate a major. While most participants were undergraduate students, a few graduate students were included.

The second sample included thirty students from Middle Eastern or Northern African nations, whose native language was Arabic and who completed the research material in Arabic. Their ages ranged from 17-49 years, with a mean age of 22.86 years (SD=5.70). One participant did

not provide age data.   There were 28 males and 2 females. Their fields of study included: engineering (50%), behavioral sciences (30%), business (6.7%), natural sciences (3.3%), and health sciences (3.3%). The remainder did not indicate a field of specialization. These participants were primarily graduate students.

Means and standard deviations for participant ages and for the research measures to follow are presented along with the scores from the main groups for comparison. In all tables in this section, the two exploratory samples along with the other Islamic sample, Malaysian, are highlighted to show the relative placements and levels. Keep in mind that the tables in this section indicate the order of groups but not the significance of the differences shown.

Table 55. Ages

	age		
	N	M	SD
Arabic	**29**	**22.86**	**5.70**
Malaysia	**183**	**21.86**	**1.38**
Korea	186	21.37	1.58
India	192	20.80	0.99
Indonesian	**29**	**20.79**	**1.76**
Berkeley	196	20.08	1.40
China	202	19.87	1.45
WSU	201	19.09	1.26
Japan	212	19.08	1.22

National Differences: Scales

The Tables 56- 94 below address the first two study goals. They provide measures of cognition for the Indonesian and Arabic-language speakers. They also provide initial comparisons of the cognitive characteristics of the two exploratory groups with the seven main groups. As with Table 55 above displaying age, the means and standard deviations of the Arabic-language, Indonesian, and Malaysian samples are provided along with the outcomes from the seven main study groups for comparison.

Analytic-Holism Scale (AHS)
Higher scores indicate higher holistic thinking.   Higher scores indicate a nonlinear view of change.

Table 56. AHS: Overall			
	N	M	SD
Indonesian	**30**	**5.56**	**0.42**
Malaysia	**183**	**5.39**	**0.44**
Korea	186	5.08	0.41
Japan	212	4.92	0.47
China	202	4.91	0.37
India	192	4.88	0.47
Arabic	**30**	**4.81**	**0.43**
Berkeley	196	4.75	0.50
WSU	201	4.65	0.50

Table 57. AHS: Perception of Change			
	N	M	SD
Japan	212	4.92	0.83
India	192	4.77	0.78
Korea	186	4.74	0.69
Malaysia	**183**	**4.71**	**0.79**
Indonesian	**30**	**4.71**	**0.72**
China	202	4.70	0.69
WSU	201	4.55	0.75
Berkeley	**196**	**4.43**	**0.78**
Arabic	**30**	**4.27**	**0.96**

Higher scores indicate a situational belief about causality.

Higher scores indicate broader attention.

Table 58. AHS: Causality	N	M	SD
Indonesian	**30**	**6.05**	**0.74**
Malaysia	**183**	**5.92**	**0.74**
China	202	5.63	0.72
Japan	212	5.37	0.95
Korea	186	5.34	0.82
Arabic	**30**	**5.24**	**0.78**
India	192	5.22	0.82
Berkeley	196	5.12	0.93
WSU	201	4.71	0.93

Table 59. AHS: Attention	N	M	SD
Indonesian	**30**	**5.63**	**0.87**
Korea	186	5.36	0.74
Malaysia	**183**	**5.29**	**0.85**
China	202	4.90	0.75
India	192	4.90	0.95
Japan	212	4.83	0.81
Berkeley	196	4.76	0.88
Arabic	**30**	**4.55**	**0.81**
WSU	201	4.42	0.95

Higher scores indicate greater tolerance for contradiction.

Table 60. AHS: Tolerance for Contradiction	N	M	SD
Indonesian	**30**	**5.84**	**0.74**
Malaysia	**183**	**5.62**	**0.66**
Arabic	**30**	**5.19**	**0.72**
WSU	201	4.91	0.86
Korea	186	4.89	0.78
Berkeley	196	4.69	0.90
India	192	4.61	0.93
Japan	212	4.57	0.80
China	202	4.38	0.69

Dialectical Thinking Inventory (DTI)

Higher scores indicate a holistic view.

Higher scores indicate a higher tolerance for contradiction.

Table 61. DTI: Holism	N	M	SD
China	202	3.57	0.32
Japan	212	3.56	0.33
Korea	186	3.49	0.30
Indonesian	**30**	**3.39**	**0.38**
Berkeley	196	3.38	0.33
Malaysia	**183**	**3.35**	**0.34**
WSU	201	3.27	0.33
India	192	3.17	0.29
Arabic	**30**	**3.05**	**0.20**

Table 62. DTI: Contradiction	N	M	SD
Korea	186	3.51	0.37
China	202	3.42	0.38
Berkeley	196	3.39	0.40
WSU	201	3.31	0.35
Indonesian	**30**	**3.21**	**0.26**
Japan	212	3.21	0.39
India	192	3.19	0.37
Arabic	**30**	**3.15**	**0.35**
Malaysia	**183**	**3.06**	**0.27**

The Exclusion Test

Higher scores indicate higher exclusion of items as irrelevant. This is associated with analytic thinking.

Table 63. Excluded Items			
	N	M	SD
Arabic	**30**	**54.33**	**17.70**
WSU	201	52.28	12.80
India	192	50.41	12.47
Berkeley	196	48.13	14.61
Malaysia	**183**	**47.33**	**14.00**
Indonesian	**30**	**44.43**	**13.47**
China	199	43.55	15.35
Japan	209	42.82	15.30
Korea	185	42.41	14.95

Relevance of Facts (ROF)

Higher scores indicate more items considered relevant.

Table 64. ROF: Dispositional (If relevant)			
	N	M	SD
India	192	0.61	0.16
China	195	0.60	0.25
Indonesian	**30**	**0.60**	**0.18**
Berkeley	181	0.60	0.21
Arabic	**30**	**0.56**	**0.19**
Malaysia	**183**	**0.53**	**0.19**
WSU	201	0.52	0.16
Japan	212	0.47	0.15
Korea	186	0.42	0.15

Table 65. ROF: Situational (If relevant)			
	N	M	SD
China	195	0.62	0.25
Berkeley	181	0.58	0.21
Malaysia	**183**	**0.54**	**0.19**
India	192	0.52	0.18
Korea	186	0.51	0.14
Japan	212	0.49	0.15
Indonesian	**30**	**0.48**	**0.14**
WSU	201	0.47	0.15
Arabic	**30**	**0.46**	**0.17**

Table 66. ROF: High Relevant Items (If relevant)			
	N	M	SD
India	192	0.90	0.08
Indonesian	**30**	**0.88**	**0.10**
China	195	0.88	0.13
Malaysia	**183**	**0.86**	**0.11**
WSU	201	0.85	0.10
Arabic	**30**	**0.83**	**0.13**
Japan	212	0.82	0.11
Korea	186	0.77	0.14
Berkeley	181	0.76	0.26

Table 67. ROF: Low Relevant Items (If relevant)			
	N	M	SD
China	195	0.43	0.34
Berkeley	181	0.43	0.30
India	192	0.34	0.24
Malaysia	**183**	**0.33**	**0.26**
Arabic	**30**	**0.31**	**0.22**
Indonesian	**30**	**0.31**	**0.20**
Korea	186	0.27	0.16
WSU	201	0.25	0.17
Japan	212	0.25	0.16

Memory of Facts (MOF)

A higher score indicates a higher recall for items.

Table 68. MOF: Dispositional			
	N	M	SD
India	192	2.45	1.23
Berkeley	196	1.83	1.28
China	195	1.80	1.27
Malaysia	**183**	**1.79**	**1.14**
WSU	201	1.59	1.13
Indonesian	**30**	**1.57**	**0.97**
Japan	212	1.09	1.10
Korea	**186**	**1.03**	**0.92**
Arabic	**30**	**0.97**	**0.76**

Table 69. MOF: Situational			
	N	M	SD
Korea	186	4.17	1.34
India	192	3.79	1.51
Malaysia	**183**	**3.75**	**1.67**
WSU	201	3.64	1.75
Berkeley	196	3.28	1.90
China	195	3.26	1.92
Indonesian	30	3.17	1.29
Japan	212	2.18	1.80
Arabic	**30**	**2.17**	**1.46**

Table 70. MOF: High Relevance			
	N	M	SD
India	192	4.35	1.53
Malaysia	**183**	**3.62**	**1.59**
Indonesian	**30**	**3.50**	**1.46**
WSU	201	3.40	1.58
Berkeley	196	3.39	1.84
China	195	3.34	1.83
Korea	186	3.07	1.25
Arabic	**30**	**2.67**	**1.49**
Japan	212	2.31	1.89

Table 71. MOF: Low Relevance			
	N	M	SD
Korea	186	2.13	0.88
Malaysia	**183**	**1.92**	**1.33**
India	192	1.90	1.15
WSU	201	1.83	1.20
Berkeley	196	1.72	1.25
China	195	1.71	1.24
Indonesian	**30**	**1.23**	**1.19**
Japan	212	0.96	1.05
Arabic	**30**	**0.47**	**0.63**

Word Association Test

A higher mean indicates categorization based attributes, a lower mean indicates relationship based categorization.

Table 72. Word Association Test			
	N	M	SD
Japan	212	0.62	0.26
China	202	0.46	0.29
Indonesian	**30**	**0.41**	**0.31**
Korea	186	0.34	0.27
Berkeley	196	0.24	0.22
Arabic	**30**	**0.23**	**0.20**
Malaysia	**183**	**0.23**	**0.23**
India	192	0.21	0.23
WSU	201	0.19	0.21

Dynamic Cognition: Chemistry Class

A positive number indicates a decision of less likely to stay/leave than the initial decision. A negative value indicates more likely to stay/leave than initial decision.

Table 73. Dynamic Cognition: Change in Stay			
	N	M	SD
China	199	0.12	1.06
Arabic	**30**	**0.03**	**2.17**
Malaysia	**181**	**-0.04**	**1.40**
Berkeley	196	-0.04	1.33
India	188	-0.15	1.54
Korea	186	-0.16	1.09
Japan	212	-0.22	1.49
WSU	201	-0.26	1.19
Indonesian	**30**	**-0.37**	**1.69**

Table 74. Dynamic Cognition: Change Leave			
	N	M	SD
Indonesian	**30**	**0.27**	**1.36**
Korea	186	0.18	0.86
Japan	212	0.13	1.41
Arabic	**29**	**0.07**	**1.41**
WSU	201	0.06	1.17
Berkeley	196	-0.07	1.12
Malaysia	**180**	**-0.11**	**1.51**
China	196	-0.15	1.20
India	186	-0.48	1.60

A higher mean indicates greater usefulness of information for making sense of events.

Table 75. Dynamic Cognition: Neutral Info			
	N	M	SD
Malaysia	**183**	**4.12**	**1.25**
China	202	3.91	1.20
Arabic	**30**	**3.89**	**1.60**
Indonesian	**30**	**3.73**	**1.38**
Japan	212	3.55	1.09
WSU	201	3.21	1.04
India	192	3.19	1.20
Berkeley	196	3.18	1.13
Korea	186	2.93	0.89

Table 76. Dynamic Cognition: Exploratory Info			
	N	M	SD
Indonesian	**30**	**4.82**	**1.06**
WSU	201	4.61	1.17
Berkeley	196	4.60	1.13
Malaysia	**183**	**4.60**	**1.22**
India	192	4.48	1.24
China	202	4.44	1.14
Japan	212	4.42	1.17
Arabic	**30**	**4.32**	**1.46**
Korea	186	3.90	1.23

Table 77. Dynamic Cognition: Confirm Stay Info			
	N	M	SD
China	202	5.28	0.93
Japan	212	4.79	1.14
Indonesian	**30**	**4.78**	**0.97**
Malaysia	**183**	**4.76**	**1.10**
Korea	186	4.66	0.88
Arabic	**30**	**4.60**	**1.42**
WSU	201	4.53	0.97
Berkeley	196	4.50	1.02
India	192	4.16	1.09

Table 78. Dynamic Cognition: Confirm Leave Info			
	N	M	SD
Berkeley	196	5.98	0.78
WSU	201	5.73	0.92
Korea	186	5.05	0.94
India	192	4.92	1.23
China	202	4.88	0.97
Indonesian	**30**	**4.82**	**1.17**
Japan	212	4.76	1.28
Malaysia	**183**	**4.42**	**1.27**
Arabic	**30**	**4.36**	**1.12**

Business Meeting

A higher mean indicates a higher rating of usefulness of source and types of information.

Table 79. Dynamic Cognition: Personal Dispositional			
	N	M	SD
Indonesian	**30**	**5.30**	**1.12**
China	202	5.05	1.11
Arabic	**30**	**4.98**	**1.71**
India	191	4.94	1.17
Malaysia	**183**	**4.76**	**1.18**
Korea	186	4.67	1.04
Berkeley	196	4.63	1.23
WSU	201	4.35	1.25
Japan	212	4.23	1.29

Table 80. Dynamic Cognition: Institutional Situational			
	N	M	SD
Indonesian	**30**	**5.02**	**1.64**
Malaysia	**183**	**4.54**	**1.42**
Japan	212	4.49	1.25
Arabic	**30**	**4.45**	**1.43**
China	202	4.32	1.27
WSU	201	4.01	1.29
Berkeley	196	3.97	1.34
India	191	3.92	1.38
Korea	186	3.81	1.08

Table 81. Dynamic Cognition: Institutional Dispositional			
	N	M	SD
China	202	5.60	1.08
Malaysia	**183**	**5.58**	**1.20**
Korea	186	5.38	0.94
Berkeley	196	5.31	1.11
Japan	212	5.19	1.18
Indonesian	**30**	**5.10**	**1.29**
WSU	201	5.04	1.06
India	191	5.00	1.13
Arabic	**30**	**4.65**	**1.37**

Table 82. Dynamic Cognition: Personal Situational			
	N	M	SD
Indonesian	**30**	**4.53**	**1.54**
Japan	212	4.35	1.39
Korea	186	4.25	1.10
Malaysia	**183**	**4.08**	**1.39**
China	202	4.03	1.24
India	191	3.74	1.33
Arabic	**30**	**3.73**	**1.39**
Berkeley	196	3.63	1.34
WSU	201	2.94	1.33

A higher mean indicates favor for the approaches.

Table 83. Dynamic Cognition: Certainty in Approach			
	N	M	SD
WSU	201	3.93	1.29
Berkeley	196	3.80	1.29
Japan	212	3.73	1.32
Malaysia	**183**	**3.67**	**1.52**
Arabic	**30**	**3.62**	**1.31**
Indonesian	**30**	**3.40**	**1.43**
Korea	186	3.37	1.31
China	202	3.18	1.18
India	191	3.13	1.23

Table 84. Dynamic Cognition: Intermediate Approach			
	N	M	SD
China	202	4.68	0.76
India	191	4.35	0.96
Korea	186	4.20	0.84
Indonesian	**30**	**4.17**	**0.94**
Malaysia	**183**	**4.15**	**1.00**
Arab	**30**	**3.99**	**1.44**
Berkeley	196	3.86	0.92
Japan	212	3.62	1.06
WSU	201	3.60	0.99

Cognition In Context

A higher score indicates a support for holistic rather than analytic approaches.

Table 85. Analytic-Holistic Thinking			
	N	M	SD
Arabic	**30**	**3.46**	**0.28**
Korea	186	3.36	0.41
India	192	3.30	0.41
Berkeley	196	3.30	0.36
Indonesian	**30**	**3.27**	**0.35**
WSU	201	3.27	0.37
China	202	3.23	0.42
Japan	212	3.15	0.39
Malaysia	**183**	**3.00**	**0.37**

A higher score indicates a support for higher rather than lower tolerance of uncertainty approaches.

Table 86. Tolerance of Uncertainty			
	N	M	SD
Korea	186	3.86	0.36
Arabic	**30**	**3.79**	**0.44**
China	202	3.75	0.46
Malaysia	**183**	**3.72**	**0.37**
WSU	201	3.68	0.47
Berkeley	196	3.64	0.41
India	192	3.52	0.46
Japan	212	3.50	0.52
Indonesian	**30**	**3.41**	**0.40**

A higher score indicates concrete rather than hypothetical approaches.

Table 87. Hypothetical Concrete			
	N	M	SD
Japan	212	3.38	0.56
India	192	3.32	0.59
WSU	201	3.32	0.40
Malaysia	**183**	**3.24**	**0.33**
Berkeley	196	3.19	0.43
Indonesian	**30**	**3.18**	**0.34**
Arabic	**30**	**3.17**	**0.51**
Korea	186	2.97	0.47
China	202	2.88	0.52

A higher score indicates higher rather than lower power distance approaches.

Table 88. Power Distance			
	N	M	SD
Arabic	**30**	**3.68**	**0.44**
India	192	3.62	0.59
WSU	201	3.40	0.53
Berkeley	196	3.39	0.56
Malaysia	**183**	**3.39**	**0.48**
Japan	212	3.29	0.67
Indonesian	**30**	**3.18**	**0.51**
Korea	186	2.85	0.59
China	202	2.78	0.61

A higher score indicates situational rather than dispositional approaches.

Table 89. Attribution			
	N	M	SD
Korea	186	3.65	0.56
China	202	3.54	0.60
Japan	212	3.35	0.57
Indonesian	**30**	**3.35**	**0.58**
India	192	3.34	0.61
Malaysia	**183**	**3.28**	**0.40**
Arabic	**30**	**3.25**	**0.57**
WSU	201	3.10	0.60
Berkeley	196	3.07	0.61

A higher score indicates a support for dialectical approaches.

Table 90. Dialectical			
	N	M	SD
Malaysia	**183**	**4.03**	**0.68**
Berkeley	196	4.01	0.60
India	192	3.97	0.59
Indonesian	**30**	**3.90**	**0.67**
WSU	201	3.80	0.66
Japan	212	3.68	0.55
China	202	3.62	0.60
Arabic	**30**	**3.56**	**0.58**
Korea	186	3.44	0.59

PANAS

A higher score indicates a higher positive affect.

Table 91. PANAS: Positive Affect			
	N	M	SD
Korea	186	3.94	0.60
Indonesian	**30**	**3.81**	**0.42**
India	192	3.75	0.56
Malaysia	**183**	**3.71**	**0.48**
WSU	201	3.54	0.73
Arabic	30	3.42	0.58
Berkeley	196	3.42	0.57
China	202	3.27	0.61
Japan	212	3.06	0.70

A higher score indicates a higher negative affect.

Table 92. PANAS: Negative Affect			
	N	M	SD
Korea	186	2.97	0.87
Japan	212	2.95	0.75
Malaysia	**183**	**2.90**	**0.76**
Indonesian	**30**	**2.64**	**0.83**
Arabic	**30**	**2.63**	**0.85**
India	192	2.36	0.70
China	202	2.33	0.75
Berkeley	196	2.29	0.66
WSU	201	2.08	0.69

Impression Management Scale (IMS)

A higher score indicates a higher explicit management.

Table 93. IMS: Explicit			
	N	M	SD
Arabic	**30**	**3.05**	**0.56**
Japan	212	2.99	0.40
China	202	2.94	0.46
Indonesian	**30**	**2.93**	**0.48**
India	192	2.75	0.50
WSU	201	2.74	0.57
Korea	186	2.59	0.48
Berkeley	196	2.56	0.50
Malaysia	**183**	**2.50**	**0.51**

A higher score indicates a higher implicit management.

Table 94. IMS: Implicit			
	N	M	SD
Arabic	**30**	**3.20**	**0.49**
Indonesian	**30**	**2.98**	**0.46**
India	192	2.97	0.52
Malaysia	**183**	**2.93**	**0.49**
WSU	201	2.87	0.55
Japan	212	2.81	0.42
China	202	2.80	0.50
Berkeley	196	2.68	0.53
Korea	186	2.42	0.49

Analysis for Commonality

The final goal of this exploratory study was to provide an initial description of the commonality shared by the three Islamic samples: the exploratory samples and the Malaysian group from the main sample. In order to assess commonality, we tabulated the span of the three samples on the ordered lists for each of 39 measures. The number for each individual measure ranged from three (3), when the three scores were adjacent to each other and uninterrupted to nine (9), where one of the three groups was the highest on the measure and another the lowest. The highest possible total was 351 and the lowest 117. The separation expected if the order of any two groups is random is 4.5. This provides a commonality baseline for groups of two. The separation expected if the order of the three groups is random is 6.0, the commonality baseline for three groups.

We then calculated the actual spans for Arabic-Indonesian, the Arabic-Malaysian, and the Indonesian-Malaysian groups and for the Arabic-Indonesian–Malaysian groups for each of the 39 measures. A lower score would indicate greater commonality while a high score greater distance. The outcomes of the spans by groups as well as the values expected by chance are presented in Table 95 below.

Table 95.

	Arab-Indonesia	Arab-Malaysia	Indonesia-Malaysia	Arab-Indonesia-Malaysia
Actual span	4.49	4.38	3.67	5.77
Chance span	4.50	4.50	4.50	6.00

This analysis suggests that the three groups are marginally closer than three randomly selected groups of three (5.77 to 6.00). We do not see evidence for a commonality of the Islamic participants on the measures used. The analysis also shows the Arabic group to be only marginally closer together to each of the other two Islamic groups (4.49 and 4.38 to 4.50) than two randomly selected groups. Finally, the analysis provides some evidence that the performance separation for Indonesian and Malaysian participants (3.67) is smaller in span than the other dyads (4.49 and 4.38) and smaller than the chance span (4.50). This suggests a link between physical, ethnic, and social commonality and cognitive commonality.

An examination of the pattern of spans provides addition information about the nature of this difference. We found that the three groups were consecutive in order in their Tolerance for Contradiction (AHS), Judgment of Low Relevance, Intermediate Approach (Dynamic Cognition), and Negative Affect (PANAS). These characteristics might be related to the Islamic worldview. They were the most divergent for Analytic-Holistic (Culture in Context) and Explicit Impression Management. These characteristics may be more related to geographic and ethnic factors

Conclusions: These analyses provide initial measures of cognition for Indonesian and Arabic-language speaking participants and allow comparisons of the cognition of the two exploratory groups with the seven main groups.

Our analyses also provide initial descriptions of the commonality shared by the three Islamic samples. While some of the measures show the three groups clustered and others show Arabic-Indonesian and Arabic-Malaysian groups clustered, overall the Indonesian and Malaysian groups to show more similar patterns. The data suggests but does not establish that these ecological, political, ethnic and social similarities of Indonesians and Malaysians have been more powerful in shaping cognition than was the shared religious and world-view of the Islamic influence. A factor that may confound this outcome is that the Arabic group included a large number of advanced students and this may have introduces different cognitive skills.

In the Discussion section of this report, we will extend this commonality analysis using a proposed profiling paradigm.

5. DISCUSSION

The Rosetta II research team developed an assessment battery that measures cultural differences in cognitive, values, and personal characteristics. The battery included standard scales, simple cognitive tasks, and related personality measures. It also included complex cognitive tasks developed specifically for the Rosetta research. The battery was administered to nine cultural samples in the native language of the groups. While some of the groups have been extensively studied, others have not and so represent an initial analysis of characteristics. We found the battery to be easy to use for documenting national differences. Almost all of the measures and key subscales were found to be highly significant in differentiating the groups. Battery outcomes also allowed us to quantify national commonalities and differences as well as to profile the characteristics of specific national groups. Overall, we have been able to:

• Develop measures to bridge the gap between basic research in cultural cognition and dynamic macrocognitive processes. The targeted processes include information use, sensemaking, decision making, and planning. These processes are particularly important for practitioners as they work to understand, anticipate, and direct the actions of multinational partners and adversaries.

• Describe and quantify cultural differences in cognition, values, and personal characteristics for samples from the West (United States), East Asia (China, Japan, and South Korea) and South Asia (Malaysia and India). Rosetta II also pioneers the cognitive assessment of Indonesian and Arab language speakers.

• Develop a metric for quantifying national similarities and differences. The metric uses the descriptive data collected with the Rosetta measures to quantify group differences and similarities opening the door for studies of the underlying cultural dynamics.

• Develop a profiling protocol for visualizing the similarities and differences between national groups. The profiles characterize patterns of specific cultural groups on important dimensions. It can allow practitioners to use similarities to heighten their impact and use differences to identify needed adaptations. These are critical first steps for effective interchanges with multinational partners and allies in applied settings.

• Provide the research foundation for tools that may speed and enhance cultural preparation for personnel and increase the fidelity of computational models for multicultural domains.

In this discussion, we will: a.) Acknowledge the limitations of culture research and the remedies that we adopted for Rosetta; 2.) Describe the power of the Rosetta Battery for quantifying characteristics of national groups; 3.) Review the method for quantifying and comparing similarity; 4.) Present our new paradigm for visualizing and comparing the cultural patterns. 5.) Outline implications for personnel training and computational modeling. 6.) Propose the next steps needed to understand and accommodate culture for commercial, humanitarian, military, and scientific applications.

5.1 The Research: Limitations and Remedies

All cross-cultural research, including Rosetta II, includes inherent difficulties. While the Rosetta Project was directed at cognitive differences, national groups vary in ways beyond this to ethnicity, education, and economic status. Cognizant of the myriad of difficulties, Rosetta adopted procedures to guard data quality. To mitigate confounding from language differences, native speakers of each language used widely accepted translations procedures to prepare research material. While the participating universities differed on several dimensions, we used participant selection criteria and standard research procedures to limit the impact of these differences. We adopted rigorous procedures for equating assessments across national group. Where standardization was not possible, an awareness of difficulties informed our interpretations of outcomes and allowed richer interpretation of results.

The most important tool for maintaining data quality was the leadership. World-class scholars at each institute supervised data collection and also helped in framing the research approach and interpreting the outcomes. Each site leader participated in the planning meeting and contributed to decisions regarding the research design, material selection, and procedures. These project leaders were sensitive to national characteristics and to precautions for accommodating differences. Each culture is a dynamic and evolving system that cannot be deterministically described. The goal must be to move towards understanding the underlying dynamics so that useful generalizations can improve interactions and effectiveness.

5.2 The Rosetta Battery: Quantifying National Differences

The Rosetta Battery included a varied set of measures. All ten (10) measures and most subscales were highly significant in discriminating the national samples. Table 5 provides the details of these analyses. Based on the complexity of national differences, we expected that the measures, while significant, would not individually account for a majority of national differences. Each measure accounted for some portion of national differences and was important for some aspects of complex cognition. This supports the value of multiple measures. A summary of each measure appears in the results. A review of the individual measures follows.

Two self-report scales, the Analytic-Holism Scale and the Dialectical Thinking Inventory were included in the study. The national samples differences were highly significantly for performance on both scales. While these two research measures captured national differences in analytic-holistic thinking, we noted interesting discrepancies. First, the subscale of Perception of Change was not well supported. In contrast to Choi's earlier research (2007), it is not related to Causality and was negatively related to Attention and Tolerance for Contradiction. This parallels recent research from other sources (Lin, 2008). Second, the results from two scales showed some variation in interpretation. Based on these findings, future assessment of analytic-holistic thinking would best include the three substantiated subscales of the Analytic-Holism Scale. This scale is recommended because of the outcomes of this study and its longer history of use.

Past research has used a variety of simple laboratory tasks to assess cognition. From these we choose the Word Association Test, the Exclusion Task, Relevance of Facts, and Memory of Facts. The Word Association Test outcomes reflected highly significant difference among the

samples. A review of the results also suggested that the categorization strategies by national also might be influenced by task instructions. This means that we need to use caution in procedural details and it also reveals the possibility of using priming effects to help direct information use. While potentially useful in practice, it also presents theoretical questions about cognitive flexibility. The Exclusion Task replicated past research and demonstrated its usefulness in distinguishing national differences in the broadness of their information use. It is also an engaging task and should be included in future efforts.

The Relevance of Facts and the Memory of Facts both provided information about the kinds of information that are considered relevant and the extent that they were judged to be relevant. Both measures and all subscales were highly significant in differentiating the national groups. Groups not only selected but they remembered parallel information providing validation for the measures and support for the importance of varying information. All four measures are important to understand how national groups may use and categorize information. Multinational teams can use the national differences identified to facilitate the sharing of information and the establishment of common ground. For groups with different memory patterns, it is particularly important to have information available during tasks so group members can retrieve information that they would not typically recall but that others in their group are using.

The two macrocognitive measures provide an initial look at the effect of culture on dynamic, complex cognition. The Dynamic Cognition measure taps the use of information and sensemaking. The measure documents how national groups make different decisions based on changes in available information. Our findings describe variations in patterns of information that influence decision making in the Rosetta groups explored. This has implication for multinational setting as Analytic-Holistic Thinking influence information use and decisions (Lin, 2008).

The Cognition In Context measures six cognitive and related dimensions in the context of naturalistic situations. The variables of Analytic-Holistic Thinking, Attribution, and Dialectical Reasoning, are conceptually close to the main interest of the study. All made highly significant differentiations among the samples. The remaining three variables were taken from the mainstream cultural research literature. We included Hofstede's Power Distance and Tolerance for Uncertainty (1980). The results from Power Distance and Tolerance for Uncertainty significantly differentiated the group but were occasionally discrepant with the findings of Hofstede's research. Two factors may contribute to this. Our work differed from Hofstede's in the context in which decisions have to be made: work setting vs. university classroom. They also differ in the nature of the sample –IBM employees vs. young adults and in point in time: the 1970's vs. the 2000's. While both dimensions differentiated the samples, future research would have to untangle the role of sample type and context. Scenarios are appropriate for the second goal. The role of generation means generalizing Hofstede's work to the present must be done with care, a problem that will continue to plague Hofstede's work. The final variable, Hypothetical-Concrete reasoning, describes differences between the use of hypothetical, or 'what if' reasoning or the use of past, concrete cases. This difference shapes the interpretation of events, the generation of plans and the making of decisions. For these reasons, it is important information for understanding both allies and adversaries.

We included two personal characteristics that influence individual response characteristics. PANAS showed differences in positive and negative affect of national groups. All groups reported positive affect higher than negative affect but they differed in the level of each. These differences influence the affective tone people bring to teamwork and negotiation as well as how groups interact under time pressure. The IMS shows differences in implicit vs. explicit impression management. National differences in impression management influences the kinds of information team members share with others, how guarded they are and how believable their responses are. While some people may explicitly display the need for social desirability other may not. IMS scores are important clues to real stance and intent and help 'translate' the messages of others.

5.3 Capturing National Similarities and Difference

Because there are a very large number of defined cultural groups, it will never be possible or necessary to master the characteristics of all unfamiliar groups. Rather, practitioners need to be able to identify critical dimensions and to use similarities and differences from known groups to moderate expectations and approaches. Similarities and differences among national groups are important but have been difficult to define and measure. For example, past research has often contrasted 'East Asians' or 'Westerners'. Practitioners seek such contrasts to ease their work but are they valid? The United States' current involvement in the Middle East has tempted people to think of 'Arab' or 'Muslim' as a useful grouping. Is this a reasonable starting point? Unfortunately, we have not had systematic methods for identifying useful common features and critical differences.

The inclusion of three Islamic groups in the present research allowed the exploration of this timely problem. Islam, while originating in the Middle East, has a very wide geographic range. Adherents to Islam from Arabic-speaking nations, Indonesia, and Malaysia all share a religious and philosophic world-view. People from the Arabic–speaking nations, however, live in a dramatically different physical, ethnic, and social world than do those from Indonesia and Malaysia. We used the data from the three Islamic groups to attempt to quantify similarity for the three Islamic groups under study.

Our analysis was exploratory but the results suggest the power of the method. The span across the three groups together for each measure and the spans for each of the three possible dyads of groups – Arabic-Indonesian, Arabic-Malaysian, and Indonesian-Malaysian suggested the commonality of the two geographically, ethnically and socially close groups. If our methods prove successful in future studies, they will provide a powerful tool for grouping nations by cognitive characteristic and for providing comparison cases for predicting new groups. If additional confirmation is forthcoming, this method can augment our judgments about unfamiliar groups.

5.4 Visualizing National Similarities and Differences: Profiling Patterns.

The pattern evaluation for similarity described above provides a good first strategy for adapting to new groups. Practitioners need to gauge commonality but they also need to see the nature of these patterns. Prediction equations are a common method for capturing complex relationships

and predicting future relationships and events. Here, data describing a set of units is organized to reflect existing relationships among variables in the form of a prediction equation. In the future, data collected from a new national group or entity, can be plugged into the prediction equation to generate a best guess about the new group. The assumption of this method is the variables included in the equation have the same relationships in all groups. At the beginning of the Rosetta research program we assumed that our data could generate a prediction equation that would allow practitioners to provide useful recommendations for interacting with new and unfamiliar groups. This would speed the development effective strategies and optimize the strategies that would emerge.

The initial analysis of data revealed a vexing problem: Rather than a single prediction equation to describe the complex phenomena understudy, we found that the measures from each national group had a distinctive pattern of relationships. Far from one common prediction pattern, each group had its own prediction pattern. While our expectations were not met, they failed for two interesting and important reasons. First, expectations for a single prediction equation emerged from research typically limited to Western and Far Eastern nations. Rosetta II differed from past research in that it included more regionally diverse groups. This contributed to the varied patterns. Second, it was not the individual measurements that characterized the groups but rather the pattern of measurements within a group. This opened the way for a different and potentially far more powerful approach to characterizing national groups. It is one that retains and describes patterns of differences rather than hiding them in a generalization.

We structured a profiling protocol to describe patterns of cultural characteristics in the Rosetta data. To evaluate patterns of national similarity, we selected 15 outcome measures that span those dimensions covered in the study and that showed good discrimination among groups. We included 4 variables from the Analytic-Holism Scale: AHS Overall score [1], and the subscale scores – Causality [2], Attention [3] and Tolerance for Contradiction [4]. These provide a link with past research and tap key conceptual dimensions of this research program. Also included were 4 variables from Cognition in Context: Attribution [5], Hypothetical-Concrete [6], Tolerance of Uncertainty [7], and Power Distance [8]. These provide pattern comparisons of broader national differences other than Analytic-Holistic Thinking. To understand patterns of information use, the Exclusion Task [9] and 3 variables were included from Dynamic Cognition – Exploratory [10], Confirming Stay [11], and Confirming Leave information [12]. Certainty [13] and intermediate [14] decision approaches from Dynamic Cognition were included to illustrate adoption of solutions. Finally, Word Association Test [15] was included to understand strategies for categorization. All the outcome variables selected were changed to standardized z-scores to allow for comparisons. Distances of 1.00 or more are considered statistically significantly different. Distances of lesser magnitude may also be of interest if they confirm the observations of experienced professionals. We undertook a series of comparisons with national groups that were expected to provide insight into the profiling method. These are detailed below.

We first used the variables described above to generate profiles for the two US samples, the University of California, Berkeley and Wright State University, groups expected to be culturally similar. These are shown in Figure 7 below. The larger the distance between two points on each outcome, the more divergent the pattern. For these samples, the largest differences were for Causality [2] and Attention [3] but the general pattern would suggest similarity in behavioral

expression for the decisions and actions framed by these dimensions. Overall, this comparison shows the commonality of US characteristics across the two institutions.
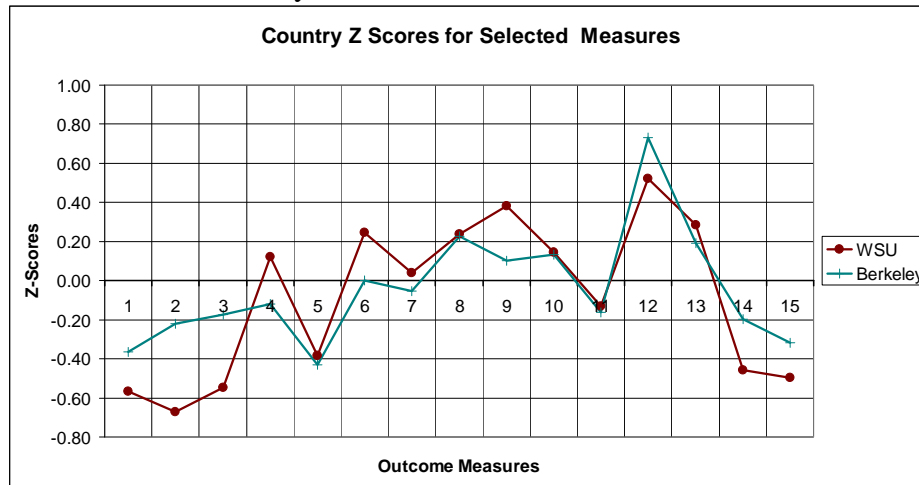

Figure 7.

The value of profiling analysis would emerge during encounters with new groups. A profile including both groups would show how your own culture differs from that of the new group. It would direct your focus to differences that should moderate your expectations and behaviors to accommodate the divergent patterns. If you had previously encountered a group with a similar profile, this could be a valuable comparison case to help guide actions until better information becomes available. Such a case might have to be adjusted for any task relevant differences between the target group and the comparison case. To illustrate profiling and this comparison process, we provide three separate comparisons. For each, we look at measures of similarity and then at the profiles that displays flash points for conflict.

We look at a comparison of two samples: Malaysia and US-WSU. Using the similarity metric introduced earlier, we find similarity or average span of measures to be 4.18. This documents a pattern more similar than the chance level of 4.50. Figure 8, which shows the cultural profiles for Malaysia and US-WSU together. While this shows considerable similarity, the US-WSU pattern for Analytic-Holistic Thinking [1 to 4] differs somewhat from that of the Malaysian group in being more holistic. The US sample also uses more Confirm Leave information [12] than the Malaysian group. The Malaysian and US-WSU groups have similar patterns on the Cognition in Context, cultural dimensions [5 to 8].

During an intercultural interchange with Malaysian personnel, U.S. personnel can assume considerable commonality. It behooves them, however, to adapt their explanations to incorporate broader contextual information, to include more situational features, and to expect contradictory information to be considered. U.S. personnel should anticipate different information needs of the Malaysians before they decide on the course of action. It would be important for US personnel to be prepared and anticipate more changes.
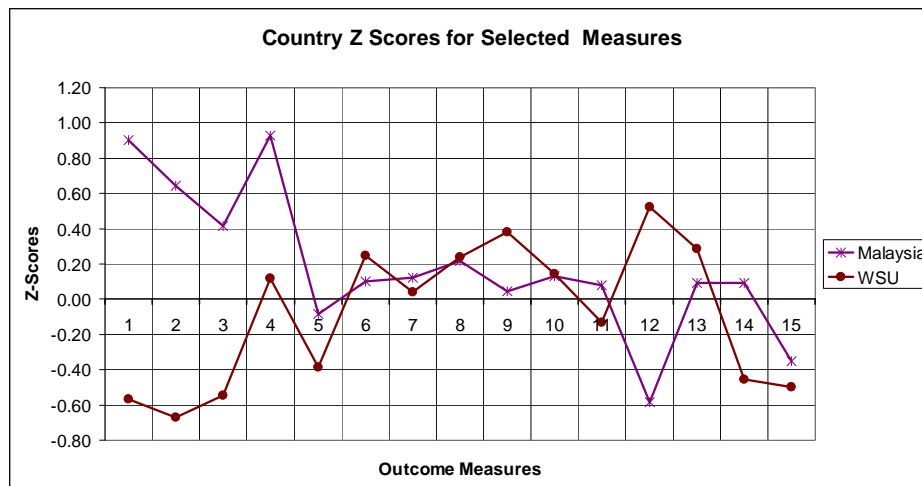
Figure 8.

We next look at the three East Asian nations, China, Japan, and Korea, often grouped together. First, the measure of span or commonality provides an initial evaluation of this assumption. Here we find that the span over the three groups is 5.85 compared to the chance level of 6.00. The span for China and Japan is 4.21; for China and Korea, 4.36; and for Japan and Korea, 4.15. This means that there is some commonality as assumed. We then look to the profiles to identify any differences that might cause conflict during interchange. See Figure 9. The profiles show potential conflicts with regard to how Japan would use Hypothetical-Concrete reasoning [6], intermediate decision approach to conflict [14], and strategy for categorization [15]. We would expect that the three groups are similar on Analytic-Holistic Thinking [1-4] and information use in Dynamic Cognition [10-12].
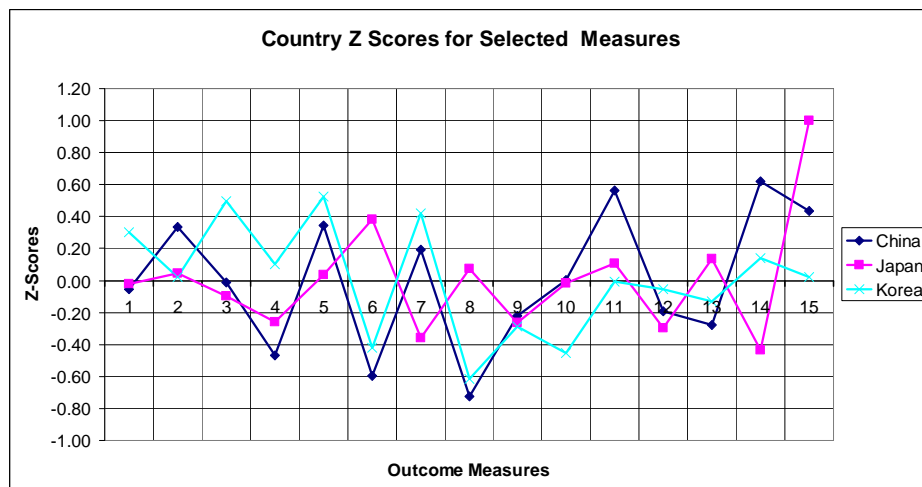
Figure 9.

Finally, we look at China, India, and the US-WSU together. The span of commonality for the three groups is 6.21 with a chance expectation of 6.00. This indicates differences beyond chance among the three nations. A look at the dyad scores helps pinpoint the nature of this conflict. The span for China and India is 4.36; for China and US-WSU, 5.15; and for India and US-WSU, 3.87. Here, the chance gap is 4.50. The lowest conflict would be expected between India and US-

WSU and the most as between China and US-WSU. This means that regardless of the historical and territoriality contributions, differences in cognition also introduce many opportunities for misunderstanding and conflict. The profiles in Figure 10 show China and India to be closer in holistic cognition than US-WSU [1-4]. They were also more likely to adopt intermediate approach when it comes to conflict [14] than the US group. However, US-WSU and India were more similar in Power Distance [8] and categorization strategy [15] than China. Each similarity will support perspective taking while each differences point to a need for accommodation.

Country Z Scores for Selected Measures

Figure 10.

5.5 From Theory to Practice

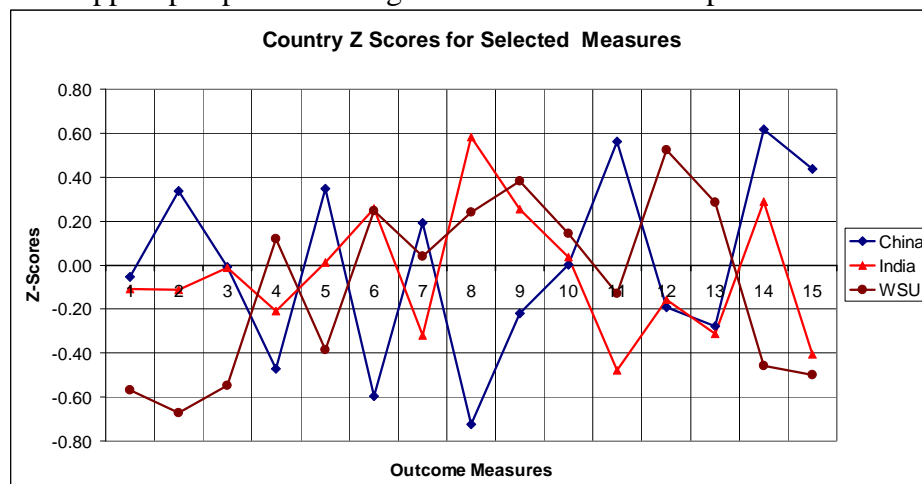This research describes the importance of quantifying and describing national patterns and opens the door for the study of underlying cultural dynamics. It also makes a case for a protocol for visualizing the similarities between and among national groups. This can aid planning for and structuring intercultural interchanges. In response, we developed and applied a profiling protocol. The profiles characterize the cognitive and values patterns of specific cultural groups on important dimensions so that points of potential conflict can be identified. Together these approaches may allow practitioners to use similarities to heighten their impact and use differences to identify needed adaptations thereby increasing the effectiveness of interchanges with multinational partners, allies, and adversaries.

While past forces prepared primarily for combat, the current military also participates in many humanitarian and peace keeping operations. While past efforts were concentrated in Europe and the Far East, today's military must be ready to work anywhere in the world. Finally, while earlier adversaries and partners were typically nation states, we must now be prepared for non-governmental entities and organizations.

Humanitarian rescue operations illustrate the role of cultural knowledge. It is sometimes necessary to relocate families away from their villages to safer locations. Even under conditions that can be dangerous and urgent, people often resist leaving behind the stability and comfort of their home. U.S. personnel provide the information they believe will convince people to relocate. It is the information that they would like to have in the same situation: direct and to the point. And it often fails. The results of the two complex cognition tasks included in the Rosetta Battery

suggest the reasons. First, cultural groups vary in the kind of information considered in decision making. Some groups place higher value on information that explored options and even provided additional neutral information. Second, cultural groups varied in the credibility they gave to source of information- institutional or personal - and to the situational or dispositional attribution of information. At the site of a rescue operation, personnel need to design information that accommodates cultural differences in order to optimize message effectiveness.

4.5.1 Training

While past research highlighted behavioral, values, and social differences, the Rosetta Project addressed cognitive differences among national groups as well. This less studied aspect of national difference is particularly important as military operations move from unilateral combat to multinational alliances, asymmetrical operations, and nation building. This shift places greater emphasis on the training of personnel to function effectively with people from many cultural groups. It also calls for computational models that can support planning and prediction. The role of culture in enhancing both training and computational modeling is introduced below.

We need tools for better preparing personnel for multinational missions. Training efforts now occurs at different levels of specificity. These missions are forwarded by an accurate understanding of the nature of the mission and the cultural characteristics of allies, host nation personnel, and adversaries interactions. If the mission is supporting a host nation as they recover from a natural disaster, customs and social roles may be important. If the mission is a joint operation with new allies, social roles and cognition may be critical.

To maximize the positive impact of training, we must sensitize troops to a wide range of differences that they are likely to see, and provide skills for identifying and working with these differences. At the other, we must provide specific information as personnel rotate into a specific village or district to replace departing troops. The first require a framework sufficiently robust to provide initial support wherever they are assigned. The second case must focus on specific mission demands and specific cultural differences.

Cultural Training is receiving increased attention in both private and government sectors. International corporations know that poor preparation of their professional staff can be very costly in terms of business and corporate image. The U.S. military understands that poor preparation for intercultural actions can undermine missions and lose lives.

Two efforts, sponsored by ARI (McCloskey, Klein, & Baxter, 2007) and by AFRL (Ong, 2007) illustrate recent efforts to provide better training to U.S. troops. Both used scenario-based exercises to provide simulated experiences with foreign nationals. Both incorporated cultural differences from the dimensions included in the present study. Trainees were introduced to the dimensions and then used this knowledge to make sense of unexpected events and to decide on a course of action consistent with their operational goals and the cultural characteristics of the others involved in the incident. This training goes beyond rules and procedures so that military personnel can see events through the eyes of adversaries or host nationals. They must be able to 'read' intent and predict reactions in order to improve communication, teamwork, and ultimately effectiveness.

4.5.2 Computational Modeling

Computational modeling promises to be a powerful tool for representing reality and for generating and testing the validity of the representations. It may allow us to simulate possible courses of action and to see the outcomes. It offered a powerful tool predicting the decisions and actions of others. Early computational models looked at domains in which a limited number of well-defined variables could be expected to account for functioning. As modeling has gained sophistication, it has attracted the attention of practitioners who need help in representing complex and dynamic domains. While early models might describe the role of supply availability in the flow of work in a production plant, industries now need to include the impact of teamwork and management policies. While early models might represent the impact of rain on the speed of a military convoy transporting supplies, models are now needed to represent factors in the human terrain that may support or delay the progression of the same convoy. In both cases sketched above this means representing the dynamics and dimensions of human cognition.

These emerging demands create critical challenges for modeling efforts. First, complex, dynamic domains place qualitatively different cognitive demands on practitioners. Rather than being able to depend on simple well-defined principles to describe simple and predictable relationships, they must represent relationships that include uncertainty and that vary over time. This requires a shift from 'microcognition' to 'macrocognition', from simple well-defined models to models than can accommodate the complexity of these situations. While past decisions and actions provide a good beginning, they are not enough.

Second, in international domains, practitioners encounter a large array of cultural differences. Rather than depending on long comfortable generalizations, modelers must take the perspective of other national groups and accommodate cultural differences. They need to move beyond ethnocentrism because models will only be as good as the data used to represent specific groups. The Rosetta measures have the potential for filling this gap and better representing the cognition of diverse national groups. Models must represent the cognitive differences that influence dynamic, real-world tasks. Without accurate representations of national cognition, we can expect poor predictions and support.

Computational modeling also promises to be a powerful tool for augmenting our ability to engage cross-national teamwork and negotiation as well as to develop and sustain cross national organizational structures. Computational models must evolve to accommodate these new needs and computational modelers must have the data necessary to populate these dynamic models.

4.6 Next Research Steps:

The Rosetta II study suggests both theoretical and applied directions for future research.

• While we have uncovered promising trends that link cognition to regional, political, religious, and ecological differences, the application of triangulation methods would better clarify key cultural differences and thereby enhance predictions based on these differences.

• While this research used college students as participants, it would be important to establish the validity of the research with military materials/sample or corporate material/sample, and so on. We are now in a position to prepare shorter and refined versions to meet specific target domains.

• While this research extended beyond the geographic range of past cultural studies of cognition, we have yet to establish a database for many critical regions of the world. East Asian nations, for example, have been widely studied and this research effort has added to the store of knowledge about two South Asian nations. We also have initial descriptions of two new samples: Indonesians and Arabic speakers. There remain many important and yet unexplored regions. We value economic development in third world nations but we do not know how best to disseminate information, organize production and transportation mechanisms, develop infrastructure, develop a technological base, and engage in constructive teamwork. The present research provides a starting point for expanding the range.

• While the scenarios used in this research have gone beyond the scales and simple tasks of earlier research, studies using realistic simulation technology and naturalistic settings could go much farther in providing realistic expectations about macrocognition.

• We have identified Rosetta measures that offer readily available dimension profiles of specific national groups. It would strengthen the quest for useful and valid profiles by comparing the data with ethnographic analysis to capture the power of each of these approaches.

Conclusions

Rosetta II measured national differences in cognition that might inform the strategies and tactics used during multinational interchanges in diverse regions, with varied goals and entities. These interchanges encompass cooperation and teamwork with allies, direction and optimization of efforts with citizens of other nations, and multinational NGO personnel, and predict, destabilize, and contain adversaries. In order to accomplish these goals, we selected cognitive dimensions that have strong research support for contributing to teamwork and communication, prediction, and negotiation. We particularly emphasized the measurement of cognition in complex and dynamic settings such as humanitarian missions; international business, scientific, and transportation enterprises; and multinational military operations. We selected national groups that would extend the geographic range past that of previous research. This expansion demands greater knowledge about the requirements of these new missions and the critical cultural factors associated with both national and non-governmental units.

The research has produced descriptive measures of cognition, values, and personal characteristics for nine groups. The measures ranged from scales based on theoretical constructs to simple cognitive tasks to complex scenario based tasks and measures of personal response styles. We also developed a metric for assessing similarity and a protocol for profiling differences. Together we have a better picture of the cultural challenges of intercultural interchanges and tools for supporting success during these challenges.

APPENDICES

Appendix A

Sample: Details related to compensation, dates and testing duration.

The Indian sample was recruited from an undergraduate course taught by the researcher and through word of mouth. During one session, a class of over a hundred students completed the research protocol. The researcher together with several graduate students administered the session. In the remaining sessions, a graduate student administered the research material to groups of twenty (20) to twenty five (25) students in a laboratory setting. Each participant received Rs. 200.00 (USD 5.00) for participation. Completion time ranges from 60 to 90 minutes. Data were collected over approximately a one-month period.

The Japanese sample was recruited from two universities in Sapporo - Hokkaido University and Hokkai Gakuen University. The standard of the former university was higher than the second. Participants were recruited from psychology-related classes and received course credits for their participation. Tested occurred during class time in groups of 40 to about 100 participants. An instructor and/or a senior graduate student were present during testing sessions. Average completion time was about 50 minutes, ranging from 40 to 90 minutes. There was no completion time difference between the two universities. Data was collected in January and June 2007.

The Korean sample was recruited from psychology courses and through an online bulletin board at Seoul National University. Participants were tested in small groups in a laboratory. A graduate student or undergraduate laboratory assistants administered the sessions. Participant received KRW 10,000 (USD 10.00) for participation. Average completion time was approximately 45 minutes, ranging up to 70 minutes. Data was collected in March and October 2007.

The Malay sample was recruited through bulletin board postings and class announcements. Participants were enrolled in an Introductory Psychology classes or had previously taken this class. They were tested in sessions outside of class time. The first session on 9 February 2007, had four groups of about 40-45 participants, while the second session, 16 February 2007, had one group of about 45-50 participants. The researcher supervised both sessions with several research assistants. Each participant received MYR20.00 (USD 5.95) for participation. Average completion time was about 62 minutes, ranging from 33 minutes to 160 minutes.

The United States -Wright State University sample was recruited from students in Introductory Psychology classes. While research participation is a course requirement, student selected the specific study in which they participated. A graduate student or laboratory assistant tested participants in groups of approximately eight. Each participant received course credit for participation. Average completion time was about 45 minutes, ranging from 35 minutes to 60 minutes. Data collection was completed from January to April 2007.

Arabic speaking and Indonesian samples   Participants were recruited from Introductory Psychology classes or volunteered in response to postings on bulletin boards, class announcements, and emails. Each participant received MYR20.00 (USD 5.95) for participation. The Arabic language testing was completed in two sessions - the first on 5 October 2007 with 25 participants and the second on 8 October 2007 with 5 students. The Indonesian testing was conducted in one session on 3 August 2007.

Appendix B

AHS

Rate each item on the scale ranging from 1 to 7 (1 = strongly disagree, 7 = strongly agree).

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

1. An individual who is currently honest will stay honest in the future. _____

2. Any phenomenon has numerous numbers of causes, although some of the causes are not known. _____

3. Everything in the universe is somehow related to each other. _____

4. We should consider the situation a person is faced with, as well as his/her personality, in order to understand one's behavior. _____

5. Nothing is unrelated. _____

6. A person who is currently living a successful life will continue to stay successful. _____

7. Any phenomenon entails a numerous number of consequences, although some of them may not be known. _____

8. Even a small change in any element of the universe can lead to significant alterations in other elements. _____

9. The whole is greater than the sum of its parts. _____

10. Future events are predictable based on present situations. _____

11. When disagreement exists among people, they should search for ways to compromise and embrace everyone's opinions. _____

12. Everything in the world is intertwined in a causal relationship. _____

13. It is more desirable to take the middle ground than go to extremes. _____

14. Current situations can change at any time. _____

15. The whole, rather than its parts, should be considered in order to understand a phenomenon. _____

16. It is not possible to understand the parts without considering the whole picture. _____

Strongly Disagree						Strongly Agree
1	2	3	4	5	6	7

17. If an event is moving toward a certain direction, it will continue to move toward that direction.   _____

18. Every phenomenon in the world moves in predictable directions.   _____

19. It is more important to pay attention to the whole than its parts.   _____

20. It is more important to pay attention to the whole context rather than the details.   _____

21. It is desirable to be in harmony, rather than in discord, with others of different opinions than one's own.   _____

22. Choosing a middle ground in an argument should be avoided.   _____

23. It is important to find a point of compromise than to debate who is right/wrong, when one's opinions conflict with other's opinions.   _____

24. We should avoid going to extremes.   _____

Instructions

This questionnaire is designed for you to indicate the typical ways in which you approach or solve problems in everyday life. There are no right or wrong answers. For each item, please use the following 5-point rating scale to indicate the extent to which you agree or disagree that the statement accurately describes the way you typically approach or solve problems. Write the appropriate number on the line ___ provided at the end of each statement.

Strongly Disagree	Disagree	Neutral (neither disagree nor agree)	Agree	Strongly Agree
1	2	3	4	5

1.   When a problem appears to have two equally effective but opposing solutions, it is likely that the problem has been poorly defined or poorly represented.   ___

2.   When faced with a puzzling issue in which there are two opposing but equally possible interpretations, I would typically gather information to rule out one of the two interpretations.___

3.   When my friend's view on an issue is opposite to my view, I usually think of situations in which both my view and my friend's view can be valid at the same time.   ___

4.   People who often give ambiguous answers when answering a question should take a position and give a more exact answer.   ___

5.   People who maintain that it is possible for two opposing interpretations of the same event to be both true are illogical or unrealistic.   ___

6.   Within a team, cooperation and competition can exist at the same time.   ___

7.   A single action or behavior can often achieve opposite objectives at the same time.   ___

8.   "If A is true, then B must be true. If B is false, then C must be true. Given that A is false, is C true or false?" Such questions lead to ineffective problem-solving skills in many areas of life.   ___

9.   In assessing whether someone is supporting a team, team members often make statements such as "He is either for us or against us." Team members who make such statements fail to see many other real possibilities.   ___

10.   In most situations, whether an act is morally right or wrong is clear cut.   ___

Strongly Disagree	Disagree	Neutral (neither disagree nor agree)	Agree	Strongly Agree
1	2	3	4	5

1.   What is in fact true can become false if the situation changes.   ___

2.   Whether an action is right or wrong is dependent on the situation in which it occurs. ___

3.   There are many statements that will remain true regardless of the context in which it is made.   ___

4.   One effective way to solve a problem is to break it up into different parts and analyze each part separately.   ___

5.   It is misleading to assess a person's performance without information about the person's background.   ___

6.   People who believe that almost everything is related to everything else are unrealistic.___

7.   The same behavior in different situations will have different meanings.   ___

8.   Very often, it is counterproductive to try solve a problem by relating it to other problems.   ___

9.   When there are several very different views on an issue, then some views must be more adequate than others.   ___

10.   Making changes to one part of a situation will almost always have a significant effect on other parts of the situation.   ___

The Murder Mystery

Instructions:

Suppose that you are the police officer in charge of a case involving a graduate student who murdered a professor (the dead professor was the graduate student's advisor). Why would the graduate student possibly murder his or her advisor? As a police officer, you must establish the motive.

In the space below, you are presented with several potential pieces of information, each of which may or may not be relevant with respect to determining a motive. Please decide whether the information is irrelevant. Place a check mark 'X' next to the item that you determine to be irrelevant.

Mark '**X**' if **Irrelevant**

Information:

☐ 1. Whether or not the professor ever sexually harassed the graduate student

☐ 2. Whether or not the professor drank alcohol

☐ 3. Whether or not the graduate student recently ended a romantic relationship

☐ 4. The professor's history of sexual abuse by his/her parents

☐ 5. The graduate student's history of mental disorders

☐ 6. The professor's history of eating disorders

☐ 7. Whether or not the graduate student and the professor were (or previously had been) engaged in a sexual relationship

☐ 8. The graduate student's sexual orientation

☐ 9. Whether or not the graduate student ever sexually harassed the professor

☐ 10. Whether the graduate student behaved unreasonably toward the professor

Mark 'X' if **Irrelevant**

☐ 11. The graduate student's height and weight

☐ 12. The professor's sexual orientation

☐ 13. The way the professor dressed

☐ 14. Whether or not the graduate student drank alcohol

☐ 15. Whether or not the graduate student smoked cigarettes

☐ 16. Whether or not the professor used email regularly

☐ 17. Whether the professor behaved unreasonably toward the graduate student

☐ 18. Whether or not the graduate student was unhelpful

☐ 19. The professor's height and weight

☐ 20. Whether or not the professor was religious

☐ 21. Whether or not the graduate student came from a dysfunctional family

☐ 22. Whether or not the professor was left-handed

☐ 23. Whether or not the graduate student was far away from his/her hometown

☐ 24. Whether or not the professor was temporarily insane

☐ 25. Whether or not the graduate student liked rock music

☐ 26. Whether or not the professor came from a dysfunctional family

☐ 27. Whether or not the graduate student ever ridiculed the professor in public

☐ 28. Whether or not the professor recently ended a romantic relationship

☐ 29. Whether or not the graduate student was an irritating person

☐ 30. The professor's history of mental disorders

☐ 31. Whether the professor was introverted or extroverted

☐ 32. Whether or not the professor smoked cigarettes

☐ 33. Whether or not the professor had a history of violence

☐ 34. Whether or not the professor was condescending toward the graduate student

☐ 35. The graduate student's history of eating disorders

☐ 36. Whether or not the professor was an irritating person

☐ 37. Whether the professor had any brothers and sisters

☐ 38. Whether the graduate student liked to attend parties

☐ 39. Whether or not the professor was unhelpful

Mark 'X' if **Irrelevant**

☐ 40. Whether or not the graduate student liked to watch violent movies

☐ 41. The graduate student's history of sexual abuse by his/her parents

☐ 42. The graduate student's IQ score

☐ 43. Whether or not the graduate student was temporarily insane

☐ 44. The way the graduate student dressed

☐ 45. Whether or not the professor was a vegetarian

☐ 46. The professor's IQ score

☐ 47. Whether or not the professor could play a musical instrument

☐ 48. What the graduate student's parents did for a living

☐ 49. Whether the professor preferred to use IBM or Macintosh computers

☐ 50. What the professor's high school GPA was

☐ 51. Whether the graduate student was introverted or extroverted

☐ 52. Whether or not the professor liked to watch violent movies

☐ 53. The number of pets the professor owned

☐ 54. The graduate student's zodiac (astrological) sign

☐ 55. Whether the graduate student ever unfairly gave the professor a bad evaluation

☐ 56. Whether or not the graduate student had a history of violence

☐ 57. Whether or not the professor had a web page

☐ 58. The professor's favorite food

☐ 59. Whether or not the graduate student lived in a dorm

☐ 60. The political preferences of the professor

☐ 61. Whether or not the professor ever ridiculed the graduate student in public

☐ 62. Whether or not the graduate student was a drug user

☐ 63. Whether the graduate student had a history of rebelling against persons in authority

☐ 64. Whether the graduate student was a basketball fan

☐ 65. Whether or not the graduate student was religious

☐ 66. Whether the graduate student and the professor had offices on different floors

☐ 67. Whether or not the graduate student used email regularly

☐ 68. Whether or not the graduate student was condescending toward the professor

Mark '**X**' if **Irrelevant**

☐ 69. Whether the professor ever unfairly gave the graduate student a bad evaluation

☐ 70. The number of publications on which The professor and the graduate student had collaborated

☐ 71. The graduate student's favorite color

☐ 72. Whether or not the professor would have retired soon

☐ 73. Whether the graduate student had any brothers and sisters

☐ 74. Whether or not the professor liked rock music

☐ 75. What the graduate student's high school GPA was

☐ 76. Whether the professor had a history of abusing his/her authority

☐ 77. Whether or not the graduate student had a web page

☐ 78. Whether or not the professor had a secretary

☐ 79. Whether the graduate student came to school on a bicycle

☐ 80. The professor's favorite color

☐ 81. What the professor was doing on the night in question

☐ 82. Whether or not the graduate student was left-handed

☐ 83. Whether the professor liked to attend parties

☐ 84. Whether the professor was a basketball fan

☐ 85. Whether the graduate student preferred to use IBM or Macintosh computers

☐ 86. What the professor's parents did for a living

☐ 87. Whether or not the professor was a drug user

☐ 88. The political preferences of the graduate student

☐ 89. The professor's zodiac (astrological) sign

☐ 90. The graduate student's favorite food

☐ 91. What the graduate student was doing on the night in question

☐ 92. Whether the professor was far away from his/her hometown

☐ 93. Whether or not the graduate student was a vegetarian

☐ 94. The number of pets the graduate student owned

☐ 95. Whether the professor came to school on a bicycle

☐ 96. Whether or not the graduate student would have received his/her Ph.D. soon

☐ 97. Whether or not the graduate student could play a musical instrument

Scenario 1

Bill was involved in a traffic accident in which he crashed his car into the front gate of a house near the main road.

The following are some facts about Bill as well as the surroundings and conditions at the time of the accident. For each fact, indicate whether you think the fact is irrelevant or relevant to the accident by circling the word "irrelevant" or "relevant" accordingly. There is no restriction on the number of facts that you can indicate irrelevant or relevant (but please answer all items). For those facts that you have circled "relevant", rate the importance of the fact as a contributing factor to the occurrence of the traffic accident by circling the appropriate number on the 5-point scale provided. For those facts that you have circled "irrelevant", no such rating is required.

Facts:

1. Bill dislikes tasks that involve the need to attend to details.　　　*Irrelevant*　　　*Relevant*

> *If relevant, rate its importance:*　1　　　　2　　　　3　　　　4　　　　5
> 　　　　　　　　　　　　　very low　　low　　moderate　　high　　very high

2. There are some trees planted near to the front gate of the house.　　*Irrelevant*　　　*Relevant*

> *If relevant, rate its importance:*　1　　　　2　　　　3　　　　4　　　　5
> 　　　　　　　　　　　　　very low　　low　　moderate　　high　　very high

3. There are some road works going on near the house.　　　*Irrelevant*　　　*Relevant*

> *If relevant, rate its importance:*　1　　　　2　　　　3　　　　4　　　　5
> 　　　　　　　　　　　　　very low　　low　　moderate　　high　　very high

4. Bill tends to disagree than agree with others.　　　*Irrelevant*　　　*Relevant*

> *If relevant, rate its importance:*　1　　　　2　　　　3　　　　4　　　　5
> 　　　　　　　　　　　　　very low　　low　　moderate　　high　　very high

5. Bill gets anxious easily.　　　*Irrelevant*　　　*Relevant*

> *If relevant, rate its importance:*　1　　　　2　　　　3　　　　4　　　　5
> 　　　　　　　　　　　　　very low　　low　　moderate　　high　　very high

6. It was raining heavily at the time of the accident.　　　*Irrelevant*　　　*Relevant*

> *If relevant, rate its importance:*　1　　　　2　　　　3　　　　4　　　　5
> 　　　　　　　　　　　　　very low　　low　　moderate　　high　　very high

7. There was no one in the house at the time of the accident.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

8. Bill has poor eyesight.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

9. There is a school along the same road where the house is.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

10. Bill's car has the same colour as the front gate of the house.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

11. Bill likes to drive at high speed.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

12. Bill likes to try new activities.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

13. The house is the first building along the main road.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

14. Bill enjoys social activities and situations.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                  very low   low   moderate   high   very high

Andrew, an undergraduate, was beaten up badly by two masked men as he was walking towards his car parked near the campus library.

The following are some facts about Andrew as well as the surroundings and conditions at the time of the incident. For each fact, indicate whether you think the fact is irrelevant or relevant to the incident by circling the word "irrelevant" or "relevant" accordingly. There is no restriction on the number of facts that you can indicate irrelevant or relevant (but please answer all items). For those facts that you have circled "relevant", rate the importance of the fact as a contributing factor to the occurrence of the incident by circling the appropriate number on the 5-point scale provided. For those facts that you have circled "irrelevant", no such rating is required.

Facts:

1. Andrew is unsystematic and disorganized.   *Irrelevant*   *Relevant*

   If relevant, rate its importance: 1   2   3   4   5
                                     very low   low   moderate   high   very high

2. Andrew has offended many people on campus.   *Irrelevant*   *Relevant*

   If relevant, rate its importance: 1   2   3   4   5
                                     very low   low   moderate   high   very high

3. It was raining slightly at the time of the incident.   *Irrelevant*   *Relevant*

   If relevant, rate its importance: 1   2   3   4   5
                                     very low   low   moderate   high   very high

4. Andrew prefers variety than routine.   *Irrelevant*   *Relevant*

   If relevant, rate its importance: 1   2   3   4   5
                                     very low   low   moderate   high   very high

5. Andrew often worries about a lot of things.   *Irrelevant*   *Relevant*

   If relevant, rate its importance: 1   2   3   4   5
                                     very low   low   moderate   high   very high

6. Incidents where other students were beaten up by
masked men have occurred in recent weeks.   *Irrelevant*   *Relevant*

   If relevant, rate its importance: 1   2   3   4   5
                                     very low   low   moderate   high   very high

7. Andrew was involved in a fight with a classmate recently
where he beat up the classmate.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

8. There were many trees planted near to the campus library.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

9. Andrew dislikes being alone.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

10. Random violence on the campus has been increasing.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

11. Andrew gets suspicious about others' intentions easily.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

12. The colour of Andrew's car is red.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

13. The campus library is one of the largest libraries in the city.   *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

14. There is an undergraduate residential hall near the campus library. *Irrelevant*   *Relevant*

If relevant, rate its importance: 1   2   3   4   5
                                    very low   low   moderate   high   very high

Appendix F

MOF

Earlier in this questionnaire, you were presented with the following scenario.

<u>Scenario</u>

Bill was involved in a traffic accident in which he crashed his car into the front gate of a house near the main road.

Instructions

After the scenario, you were presented with a list of some facts about Bill as well as the surroundings and conditions at the time of the accident. In the space provided below, write down as many of the facts as you can remember.

<u>Facts</u>:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

WAT

Instructions

There are 18 questions on this test. In each question, there are three things listed. Indicate, in your opinion, which TWO of the three things belong together. For each question, select one and only one answer by circling a), b), or c). Please answer all questions.

_____

1. actor singer movie

   a) actor singer
   b) actor movie
   c) singer movie

2. drink cup plate

   a) drink cup
   b) drink plate
   c) cup plate

3. patient lifeguard doctor

   a) patient lifeguard
   b) patient doctor
   c) lifeguard doctor

4. pencil ink pen

   a) pencil ink
   b) pencil pen
   c) ink pen

5. bedroom kitchen food

   a) bedroom kitchen
   b) bedroom food
   c) kitchen food

6. grass butterfly flower

   a) grass butterfly
   b) grass flower
   c) butterfly flower

7. spoon fork soup

    a) spoon fork
    b) spoon soup
    c) fork soup

8. clock watch wrist

    a) clock watch
    b) clock wrist
    c) watch wrist

9. fish bird tree

    a) fish bird
    b) fish tree
    c) bird tree

10. radio music newspaper

    a) radio music
    b) radio newspaper
    c) music newspaper

11. customer teacher salesman

    a) customer teacher
    b) customer salesman
    c) teacher salesman

12. foot shoe hand

    a) foot shoe
    b) foot hand
    c) shoe hand

13. criminal policeman soldier

    a) criminal policeman
    b) criminal soldier
    c) policeman soldier

14. night sun moon

       a) night sun
       b) night moon
       c) sun moon

15. eyes ears noise

       a) eyes ears
       b) eyes noise
       c) ears noise

16. sea salt sugar

       a) sea salt
       b) sea sugar
       c) salt sugar

17. candle fire torch

       a) candle fire
       b) candle torch
       c) fire torch

18. water fire swimmer

       a) water fire
       b) water swimmer
       c) fire swimmer

Appendix H

The Chemistry Class

Mr. Nelson teaches Chemistry. One morning, his class is running a complicated experiment. As the experiment reaches the critical point, he hears someone running down the hall yelling, " I smell smoke, leave the building". When Mr. Nelson looks out the door, he does not recognize the person

Mr. Nelson is not sure what he should do. It is possible that the person is upset or is trying to disturb classes. Mr. Nelson opens the door to the room and sees a little smoke coming from the hallway. He notices that the two other Chemistry teachers were still in their rooms running experiments. If it really is smoke and if the smoke is coming from a fire, he and his students could be injured if they stay in the building. If there is no fire and class rushes out of the building, the class would be disrupted and chemistry experiment might release toxic fumes injuring students in other classes.

What would YOU do if you were in Mr. Nelson's place? How would <u>YOU</u> judge each of the two decisions below? Rate each from 1 (Very poor decision) to 7 (Very good decision)

Very Poor decision					*Very good decision*	
1	2	3	4	5	6	7

1. **Continue the experiment and see how things develop.**
   1   2   3   4   5   6   7

2**. Leave the building with the class immediately.**
   1   2   3   4   5   6   7

Can you think of a better action for Mr. Nelson to take?

Answer:

Mr. Nelson waits a few minutes because he is unsure as to what would be best. How useful would each of these actions be in helping Mr. Nelson make a good decision? Rate each from 1 (Not at all useful) to 7 (Very Useful).

Not at all useful						*Very useful*
1	2	3	4	5	6	7

1. Reading the school handbook's emergency procedures.

1	2	3	4	5	6	7

2. Asking the other chemistry teachers about their class experiments.

1	2	3	4	5	6	7

3. Noticing that most of the other instructors are still teaching.

1	2	3	4	5	6	7

4. Smelling fumes in the hallway.

1	2	3	4	5	6	7

5. Learning if the person who ran down the hall is trustworthy.

1	2	3	4	5	6	7

6. Hearing people shouting in the hallway.

1	2	3	4	5	6	7

7. Learning about weather conditions in the area.

1	2	3	4	5	6	7

8. Seeing that the hallway is now clear of smoke.

1	2	3	4	5	6	7

9. Learning if the office is aware of a problem.

1	2	3	4	5	6	7

10. Noticing that the class experiment requires attention.

1	2	3	4	5	6	7

11. Seeing smoke coming from another classroom.

1	2	3	4	5	6	7

12. Observing the reactions of the students in the class.

1	2	3	4	5	6	7

Mr. Nelson takes a few minutes to think more about the decision. If YOU were in Mr. Nelson's place, how would <u>YOU</u> now judge each of the two decisions? Rate each from 1 (Very poor decision) to 7 (Very good decision)

Very Poor decision					*Very good decision*	
1	2	3	4	5	6	7

1. Continue the experiment and see how things develop.

1	2	3	4	5	6	7

2. Leave the building with the class immediately.

1	2	3	4	5	6	7

Why do you now think your two judgments are the best?

Answer:

If Mr. Nelson decides to leave the building, how effective would you judge each of these plans?

Not at all effective					*Very effective*	
1	2	3	4	5	6	7

1. Select the route that looks best at time he leaves the building.

1	2	3	4	5	6	7

2. Take the escape route specified in the teacher's handbook.

1	2	3	4	5	6	7

3. Follow other people as he leaves the building.

1	2	3	4	5	6	7

4. Use the route that he usually takes to and from his classroom.

1	2	3	4	5	6	7

Preparing for a Business Meeting

Roger works for an advertising company. His boss asked him to meet potential customer at a computer company, TechPower Systems (TPS), in Detroit a few hours away. This is the first time he has been sent on a marketing trip. If Roger can convince TPS to hire his advertising company, his boss will be very pleased and may give him a raise and a promotion. He has an hour to prepare for the meeting.

Roger wants to do a very good job but he doesn't know how best to prepare. How do YOU think Roger should spend the hour? Which actions would most help Roger do a good job? Remember, time is limited so he can only do a few of these.

Not at all useful						*Very useful*
1	2	3	4	5	6	7

1. Calling a friend who works in Detroit to talk about TPS products.
   1   2   3   4   5   6   7

2. Checking company records to learn about other computer companies.
   1   2   3   4   5   6   7

3. Consulting with co-workers who know the managers of TPS.
   1   2   3   4   5   6   7

4. Reading information about the current economic situation in Detroit.
   1   2   3   4   5   6   7

5. Searching his company's records for information on TPS managers.
   1   2   3   4   5   6   7

6. Contacting a cousin who is familiar with the computer industry.
   1   2   3   4   5   6   7

7. Reviewing advertising brochures describing TPS products.
   1   2   3   4   5   6   7

8. Talking with a friend who knows about the business climate in Detroit.
   1   2   3   4   5   6   7

For those actions you have thought very useful, please explain why?

Answer:

A few minutes before Roger should leave for the plane, he realizes that he should review his company's TPS file on the way. He asks the secretary for the file. She says that she doesn't have it, but that if he can wait twenty minutes, she can pick it up from another department. Roger is not sure he can make his plane if he waits 20 minutes.

If YOU were in Roger's place, which choice do YOU think would be most helpful for the trip? Judge each of the following decisions by rating 1 (Not at all helpful) to 7 (Very helpful).

Not at all helpful						*Very helpful*
1	2	3	4	5	6	7

1. Take the file of a similar company, and leave immediately to be sure to catch your plane.
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

2. Leave immediately without the TPS file to be sure to can catch your plane.
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

3. Take five minutes to arrange for the secretary to send the file, hoping it will arrive in time.
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

4. Wait for the TPS file, even though you'll have to rush and may miss your plane.
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Why did you make these judgments?

Answer:

Roger waits for the TPS file. When he leaves the building, he knows that he must hurry to get the plane. He doesn't want to be late. As he drives towards the main road, his usual route to the airport, he sees that the traffic is very slow.

Which of these choices do YOU think would be most effective in helping Roger make the plane? Judge how effective each would be by rating it 1 (Not at all effective) to 7 (Very effective).

Not at all effective						*Very effective*
1	2	3	4	5	6	7

1. Take the main road to the airport because he has always used it in the past.
 1 2 3 4 5 6 7

2. Get on the main road but get off and use less familiar roads if it doesn't speed up.
 1 2 3 4 5 6 7

3. Take a taxi hoping that the driver will know the fastest route.
 1 2 3 4 5 6 7

4. Take less familiar roads to avoid the traffic and hope he can find the way.
 1 2 3 4 5 6 7

5. Get on main road, even though it seems slow hoping it will speed up soon.
 1 2 3 4 5 6 7

Thank you for your help.

Opening a factory in the U.S.

Many organizations that start business overseas have difficulty because of the cultural differences of employees. Because executives find it helpful to have advice ahead, we are asking you for your judgment of good approaches for working with American employees.

An executive from a multinational corporation comes to the United States to open a factory. He has to decide where to locate the plant. He also needs to decide how to manage production; resources; the selection and compensation of employees; and, task assignments. He wonders what are the best approaches to all of these tasks. He understands that Americans may think and work differently from people in his country. He wants to learn more about working in the U.S.

A. Some of the approaches below are important to American employees and some are not very important. Rate how important you believe each approach is for most Americans:

Not Important					Very Important
1	2	3	4	5	6

1. Hire people who are recommended by trusted people.
     1   2   3   4   5   6

2. Employees separate work from social life.
     1   2   3   4   5   6

3. Analysis can overcome unexpected complications.
     1   2   3   4   5   6

4. Willing to act before planning is complete.
     1   2   3   4   5   6

5. Change plans based on imagined outcomes.
     1   2   3   4   5   6

6. Restrict information available to employees.
     1   2   3   4   5   6

7. Resolve loose ends during planning.
     1   2   3   4   5   6

8. Pay attention to the big picture to avoid problem.
     1   2   3   4   5   6

9. Use new ideas to guide actions.
     1   2   3   4   5   6

10. Allowing employees to make decisions.
     1   2   3   4   5   6

Not Important					Very Important
1	2	3	4	5	6

11. Avoid ideas that may disrupt ongoing activities.

      1   2   3   4   5   6

12. Pay attention to the details to avoid problems.

      1   2   3   4   5   6

13. Borrow past approaches.

      1   2   3   4   5   6

14. Welcome ideas that may change ongoing plans.

      1   2   3   4   5   6

15. Share information with employees.

      1   2   3   4   5   6

16. Intuition can help adapt to unexpected complications.

      1   2   3   4   5   6

17. Use past teaching to guide actions.

      1   2   3   4   5   6

18. Workers expect to be told what to do.

      1   2   3   4   5   6

19. Settle on one option.

      1   2   3   4   5   6

20. Seek innovative ideas.

      1   2   3   4   5   6

21. Attend to regional competitors.

      1   2   3   4   5   6

22. Provide symbols of status.

      1   2   3   4   5   6

23. Stick to plan based on past cases.

      1   2   3   4   5   6

24. Reexamine options continually.

      1   2   3   4   5   6

25. Use analysis to make sense out of the situation.

      1   2   3   4   5   6

26. Implement new approaches.

      1   2   3   4   5   6

Not Important					Very Important
1	2	3	4	5	6

27. Workers expect to be consulted.

| 1 | 2 | 3 | 4 | 5 | 6 |

28. Willing to hold off action until planning is complete.

| 1 | 2 | 3 | 4 | 5 | 6 |

29. Seek traditional ideas.

| 1 | 2 | 3 | 4 | 5 | 6 |

30. Discourage symbols of status.

| 1 | 2 | 3 | 4 | 5 | 6 |

31. Use intuition to make sense out of problem.

| 1 | 2 | 3 | 4 | 5 | 6 |

32. Keeping options opened during planning.

| 1 | 2 | 3 | 4 | 5 | 6 |

33. Expecting supervisors to make decisions.

| 1 | 2 | 3 | 4 | 5 | 6 |

34. Attend to company's goals.

| 1 | 2 | 3 | 4 | 5 | 6 |

B. As they prepare to start production, the Financial Advisor (FA) tells the executive that the cost of electricity is 40% higher than he had estimated. The executive wants to understand why FA's cost estimate was so far off. How important would most Americans think each of the following would be to the accuracy of the estimate?

Not Important					Very Important
1	2	3	4	5	6

1. The competence of the FA.

| 1 | 2 | 3 | 4 | 5 | 6 |

2. The political impact of a recent election.

| 1 | 2 | 3 | 4 | 5 | 6 |

3. The honesty of the FA.

| 1 | 2 | 3 | 4 | 5 | 6 |

4. The educational level of the FA.

| 1 | 2 | 3 | 4 | 5 | 6 |

5. National changes in the business climate.

| 1 | 2 | 3 | 4 | 5 | 6 |

6. Recent changes in tax rates.

    1   2   3   4   5   6

7. The intelligence of the FA.

    1   2   3   4   5   6

8. Changes in prices for labor.

    1   2   3   4   5   6

C. The increased electricity costs mean the corporation will lose money. The executive can change the prices of their product or change the quality of the product by cutting costs. If they increase prices, sales might drop. If they change quality, customers might complain. The executive wants to understand how important each of the actions below would be considered in the U.S.?

Not Important					Very Important
1	2	3	4	5	6

1. Increase the price to start.

    1   2   3   4   5   6

2. Tell friends and relatives about your problem.

    1   2   3   4   5   6

3. Find a source of power other than electricity.

    1   2   3   4   5   6

4. Contact friends in government.

    1   2   3   4   5   6

5. Change quality when sales increase.

    1   2   3   4   5   6

6. Change quality to start.

    1   2   3   4   5   6

7. Talk with the electric company.

    1   2   3   4   5   6

8. Change the prices over the next year.

    1   2   3   4   5   6

Appendix J

PANAS

The following 20 items describe the different types of feeling that may be experienced by a person. For each item, use the following 5-point rating scale to describe the extent to which you experience the feeling <u>in general</u>. **IN GENERAL**, that is, on the average, rate how you felt:

Use the following scale to record your answers.

1	2	3	4	5
very slightly or not at all	a little	moderately	quit a bit	extremely

_____ interested   _____ irritable

_____ distressed   _____ alert

_____ excited   _____ ashamed

_____ upset   _____ inspired

_____ strong   _____ nervous

_____ guilty   _____ determined

_____ scared   _____ attentive

_____ hostile   _____ jittery

_____ enthusiastic   _____ active

_____ proud   _____ afraid

Appendix K

IMS

INSTRUCTIONS

The following items describe personal perceptions, values, styles, and preferences that may or may not describe you. Use the 5-point rating scale provided below to rate the extent to which you agree of disagree with each statement. Please answer ALL items.

Strongly Disagree	Disagree	Neutral (neither disagree nor agree)	Agree	Strongly Agree
1	2	3	4	5

1. I sometimes try to get even rather than forgive and forget. _____

2. I have done things that I don't tell other people about. _____

3. I never cover up my mistakes. _____

4. I sometimes tell lies if I have to. _____

5. When I hear people talking privately, I avoid listening. _____

6. There have been occasions when I have taken advantage of someone. _____

7. I don't gossip about other people's business. _____

8. I have said something bad about a friend behind his or her back. _____

9. My first impressions of people usually turn out to be right. _____

10. I never regret my decisions. _____

11. I have not always been honest with myself. _____

12. I don't care to know what other people really think of me. _____

13. When my emotions are aroused, it biases my thinking. _____

14. I don't always know the reasons why I do the things I do. _____

15. It would be hard for me to break any of my bad habits. _____

16. I am a completely rational person. _____

Appendix L

Information Sheet

1. Age: _____ **Years**

2. Gender: _____ **Male** _____**Female**

3. Academic major: _____

4. Grade point average (High School) _____

5. Grade point average (College) _____

6. Your year in school: **Year 1 (Freshman)** ____

Year 2 (Sophomore) ____

Year 3 (Junior) ____

Year 4 (Senior) ____

7. Primary (first) language: _____

8. Language spoken with parents: _____

9. Other than your primary language, is there another language you feel comfortable speaking?

_____ **If so, please circle the one that describes how comfortable you are in speaking this**

language.

Not at all   Somewhat   A fair amount   A great deal   Completely

10. Your country of birth: _____

11. Country of your mother's birth: _____

12. Country of your father's birth: _____

13. Have you lived outside of [the United States] for over a year? ____ **Yes** ___ **No**

Length of time:_____ **What was your age?** _____

14. Nationality/Ethnic/Cultural background: Please circle

[(1) African American (2) Caucasian (3) Asian American (4) Native American (5) Hispanic (6) Other]

Please circle how strongly do you identify with this background?

Not at all   Somewhat   A fair amount   A great deal   Completely

Thank you for your help.

Appendix M

What does AHS predicts?

We then examined how analytic-holistic tendencies predict response to the categorization task, the information judgment tasks, memory task, and the complex cognition tasks. If people who have different analytic and holistic orientations show different patterns of responses on these tasks this would allow the selection of effective measures for multinational settings. The results are shown the table below.

Correlation between AHS Overall and Subscales and Other Measures

Task: Micro Cognition			*r*		
	Overall	Causality	Attention	Contradiction	P of C
Word Association Test	.01	.05	.02	-.11**	.07*
Exclusion Test	-.12**	-.17**	-.09**	.00	.01
Relevance of Facts					
- Dispositional	-.01	.09**	-.02	-.04	-.06**
- Situational	.05	.14**	.06*	-.02	-.08**
- High Relevance	.08**	.12**	.03	.003	.02
- Low Relevance	.01	.10**	.03	-.03	-.09**
Memory of Facts					
- Dispositional Items	.01	.03	-.02	.02	-.01
- Situational Items	.08**	.04	.04	.09**	.01
- High Relevance	.05	.02	-.002	.08**	.01
- Low Relevance	.06*	.06*	.04	.04	-.003
IMS					
- Explicit	-.08**	-.01	-.02	-.07**	-.08**
- Implicit	-.04	.01	-.02	.01	-.11*
PANAS					
- PA	.14	.10	.14	.16	-.08
- NA	.16	.09	.07	.09	.12

Task: Macro Cognition			*R*		
	Overall	Causality	Attention	Contradiction	P of C
Cognition in Context					
- AH Thinking	-.09**	-.09**	.03	-.08**	-.06*
- TU	.02	.03	.00	-.01	.03
- H-C Reasoning	-.02	-.06*	-.02	.03	-.01
- Power Distance	-.05	-.09**	-.03	.05	-.03
- Attribution	.01	.02	.06*	-.03	-.04
- Dialectical	.12**	.12**	.14*	.18**	-.19**
Dynamic Cognition					
Chemistry Class					
- Neutral Items	.12**	.12**	.08**	.12**	-.07*
- Exploratory Items	.03	.05*	.00	.09**	-.08**
- Confirm Stay Items	.10**	.13**	.07*	.05	-.04
- Confirm Leave Items	-.07**	-.07**	-.03	-.01	-.06*
Business Meeting					
- Personal Disp	.16**	.13**	.18**	.09**	-.05
- Institutional Disp	.14**	.15**	.10**	.07**	-.01
- Personal Sit	.13**	.14**	.13**	.04	-.03
- Institutional Sit	.08**	.11**	.05	.08**	-.06*
- Certainty	-.06*	-.03	-.01	.003	-.10**
- Intermediate	.11**	.13**	.13**	.02	-.05

<u>Conclusion</u>:

The AHS scores overall and by subscales are significantly correlated to a majority of the study variables. These include the selection and use of information, judgments and the complex cognitive tasks. This suggests the fundamental contributions of analytic –holistic thinking to these macrocognitive operations. The patterns of cultural differences, however, may be more useful than individual measures in predicting specific macrocognitive tasks. This is developed further with the introduction of the profiling approach, in the discussion section.

Appendix N
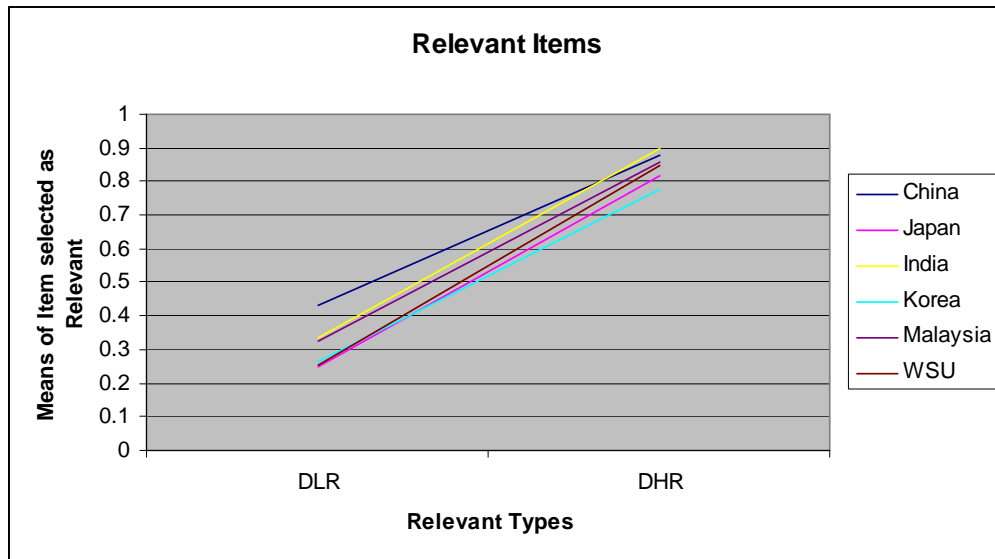
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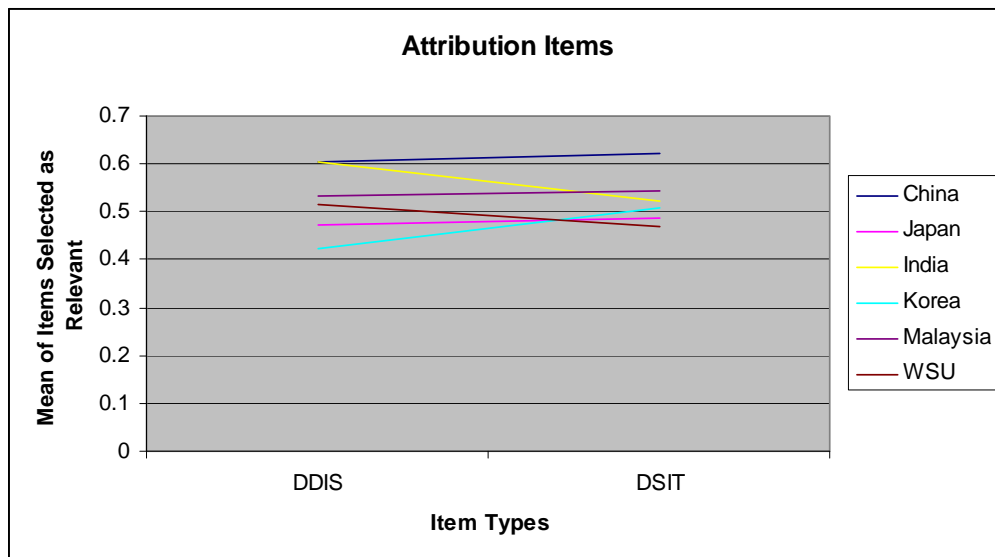
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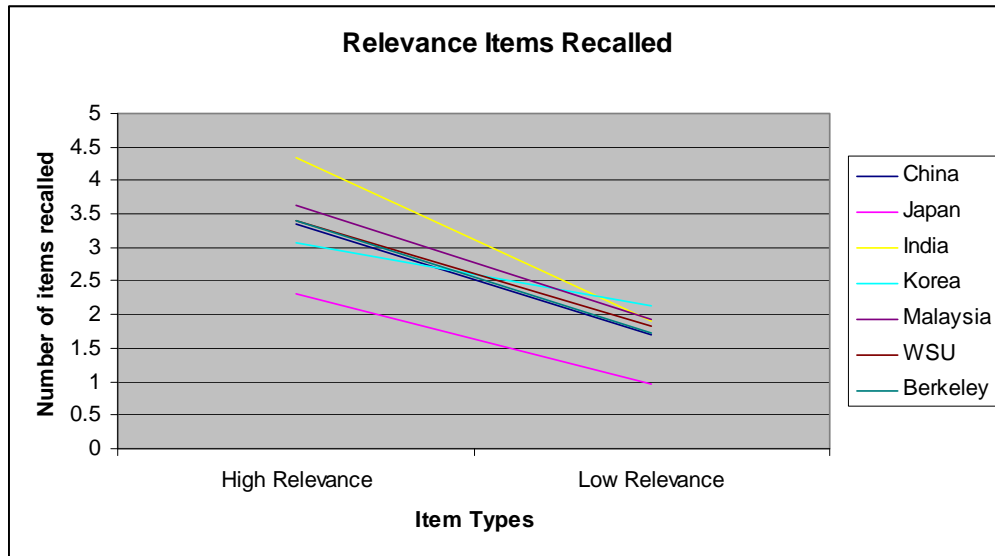
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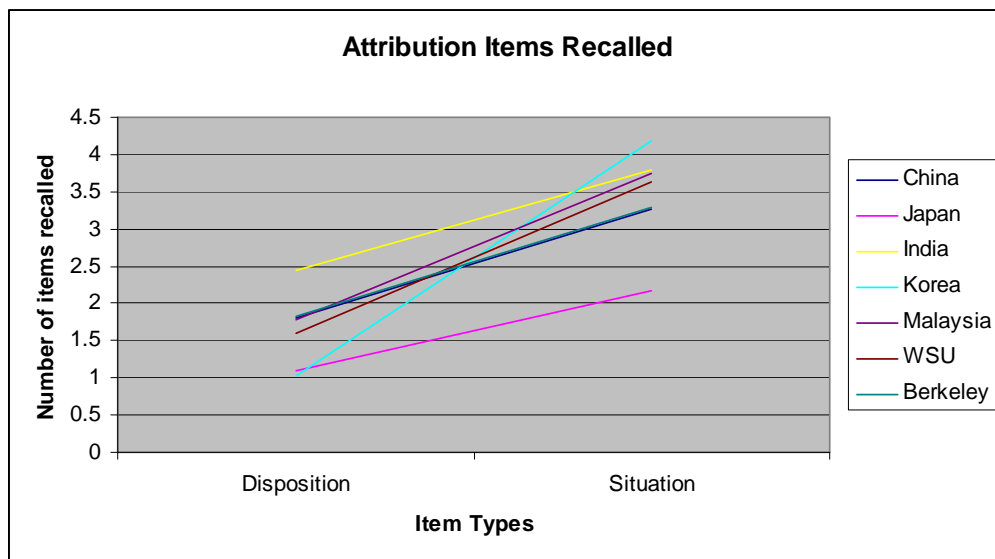
Figure 6.

REFERENCES

Berry, J.W. (1986). The comparative study of cognitive abilities: A summary. In S. E. Newstead, S. H. Irvine & P. L. Dann (Eds.), *Human assessment: Cognition and motivation* (pp. 57-74). Dordrecht, Netherlands: Martinus Nijholt.

Berry, J. W., Poortinga, Y. H., Segall. M. H. & Dasen, P. R. (2002). *Cross-Cultural Psychology* (2nd ed.). Cambridge, United Kingdom: Cambridge University Press

Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, *1*, 185-216.

Choi, I, Koo, M., & Choi, J. (2007). Individual differences in analytic versus holistic thinking. *Personality and Social Psychology Bulletin, 33,* 691-705

Choi, I, Dalal, R., Kim-Prieto, C., & Park, H. (2003). Culture and judgment of causal relevance. *Journal of Personality and Social Psychology, 84,* 46–59.

Choi, I., & Nisbett, R. E. (1998). Situational salience and cultural differences in the correspondence bias and actor–observer bias. *Personality and Social Psychology Bulletin, 24,* 949–960.

Choi, I., Nisbett, R. E., & Norenzayan, A. (1999). Causal attribution across cultures: Variation and universality. *Psychological Bulletin, 125,* 47-63.

Scales, R. H. (2006). "Clausewitz and World War IV," *Armed Forces Journal.* http://www.armedforcesjournal.com/2006/07/1866019 (Accessed 18 December 2007).

Hofstede, G. (1980). *Culture's consequences: International differences in work-related values.* Beverly Hills, CA: Sage

House, R. J., et al. (2004). *Culture, Leadership, and Organizations: The GLOBE Study of 62 Societies*. Thousand Oaks, CA: Sage Publications.

Ji, L. J., Peng, K., & Nisbett. R.E. (2000). Culture, control and perception of relationship in the environment. *Journal of Personality and Social Psychology, 78,* 943-955.

Ji, L., Nisbett, R. E., & Su, Y. (2001). Culture, change, and prediction. *Psychological Science, 12,* 450–456.

Ji, L., Zhang, Z., & Nisbett, R. E. (2004). Is it culture or is it language? Examination of language effects in cross-cultural research on categorization. *Journal of Personality and Social Psychology*, *87*, 57-65.

Klein, G., Ross, K. G., Moon, B. M., Klein, D. E., Hoffman, R. R., & Hollnagel, E. (2003). "Macrocognition," *IEEE Intelligent Systems*, *18*, 81-85.

Klein, G., Wolf, S., Militello, L., & Zsambok, C. (1995). Characteristics of skilled option generation in chess. *Organizational Behavior and Human Decision Processes, 62*, 63-69.

Klein, H. A. (2004a). Cognition in natural settings: The cultural lens model. In M. Kaplan (Ed.), *Cultural ergonomics: Advances in human performance and cognitive engineering* (pp. 249–280). Oxford: Elsevier.

Klein, H. A. (2004b). Cultural differences in cognition: Barriers in multinational collaborations. In H. Montgomery, R. Lipshitz & B. Brehmer. How do professionals make decisions? (pp. 243-253). Mahwah, NJ: Erlbaum.

Klein, H. A. (2003). The Cultural Lens Model: Understanding cognitive differences and aviation safety. In Proceedings of the 12th International Symposium on Aviation Psychology. Dayton, Oh: Association of Aviation Psychologists.

Klein, H. A., Lin, M., Radford, M., Masuda, T., Choi, I., Lien, Y-W., Yeh, Y-Y., & Chu, C. (2006). *The Rosetta Project: Measuring National Differences*. Technical Report prepared for the Air Force Research Laboratory/Human Effectiveness, Dayton, Ohio and AOARD, Tokyo, Japan.

Klein, H. A., Klein, G., & Mumaw, R. (2001b). *Culture-sensitive aviation demands: Links to cultural dimensions*. Technical report completed for the Boeing Company under General Consultant Services Agreement 6-1111-10A-0112.

Klein, H.A. & Steele-Johnson, D. (2007). Multinational Collaboration: From the laboratory to the field. In R. R. Hoffman (Ed.), Expertise out of context (pp. 473-506 Mahwah, NJ: Erlbaum.

Klein, H. A. & Lin., M. (2006a). Dynamic Cognition. *Unpublished Measure*, Wright State University.

Klein, H. A. & Lin., M. (2006b). Cognition in Context. *Unpublished Measure*, Wright State University.

Kluckholn, F., & Strodtbeck, F. L. (1961). *Variations in value orientations*. Evanston, IL: Row, Peterson.

Lin, M. (2008). Analytic-Holistic Thinking, Information Use, and Sensemaking During Unfolding Events. (Doctoral Dissertation)

Lin, M. & Klein, H. A. (2008). Athletes, murderers, and a Chinese farmer: Cultural perspectives on sensemaking. In J.M.C Schraagen, L. Militello, T. Ormerod, & R. Lipshitz (Eds.), *Naturalistic Decision Making and Macrocognition* (pp. 159-181). Aldershot, United Kingdom: Ashgate.

Markus, H. R., & Kitayama, S. (1991). Culture and the self: Implications for cognition, emotion, and motivation. *Psychological Review, 98*, 224–253.

Masuda, T., Ellsworth, P. C., Mesquita, B., Leu, J., Tanida, S., & Van de Veerdonk, E. (2008). "Placing the face in context: Cultural differences in the perception of facial emotion." *Journal of Personality and Social Psychology*, 94: 365-381.

Masuda, T., & Nisbett, R. E. (2006). Culture and change blindness. *Cognitive Science*, *30*, 381–399.

Masuda, T., & Nisbett, R. E. (2001). Attending holistically versus analytically: Comparing the context sensitivity of Japanese and Americans. *Journal of Personality and Social Psychology, 81,* 922-934.

McCloskey, M., Klein, H. A., & Baxter, H. (2007). *Cultural Perspective Taking.* Final technical report prepared under contract No.: W91WAW-07-P-0284 for the Army Research Institute, Springboro, OH: 361 Interactive, LLC.

Montgomery, H., Lipshitz, R. & Brehmer, B. (2004). *How do professionals make decisions?* Mahwah, NJ: Erlbaum.

Morris, M., & Peng, K. (1994). Culture and cause: American and Chinese attributions for social and physical events. *Journal of Personality and Social Psychology, 67,* 949–971.

Nisbett, R. E. (2003). *The geography of thought: How Asians and Westerners think differently…and why*. New York: The Free Press.

Nisbett, R. E., Choi, I., Peng, K., & Norenzayan, A. (2001). Culture and system of thoughts: Holistic versus analytic cognition. *Psychological Review, 108,* 291–310.

Norenzayan, A., Smith, E. E., Kim, B. J., & Nisbett, R. E. (2002). Cultural preferences for formal versus intuitive reasoning. *Cognitive Science, 26,* 653-684.

Ong, J. (2007). *Scenario- Based Training for Socio-Cultural Effects-Based Planning.* Final Technical Report prepared under contract #:FA8650-07-M-6738 Stottler-Henke Associates, Inc., San Mateo, CA: Stottler-Henke Associates, Inc.

Paulhus, D. L. (1988). Assessing self-deception and impression management in self-reports: The Balanced Inventory of Desirable Responding. Unpublished manual, University of British Columbia, Vancouver, Canada.

Peng, K., & Nisbett, R. E. (1999). Culture, dialectics, and reasoning about contradiction. *American Psychologist, 54,* 741–754.

Schraagen, J.M.C., Militello, L., Ormerod, T., & Lipshitz, R. (2008), *Naturalistic Decision Making and Macrocognition*. Aldershot, United Kingdom: Ashgate.

Schweder, R., & Bourne, E. J. (1992). Does the concept of the person vary cross-culturally? In A. J. Marsella & G. M. White (Eds.), *Cultural conceptions of mental health and therapy* (pp. 97-137). Dordrecht: Reidel.

Segall, M. H., Dasen, P. R., Berry, J. W., & Poortinga, Y. H. (1990). *Human behavior on global perspective: An introduction to cross-cultural psychology*. New York: Pergamon Press.

Triandis, H. C. (1995). *Individualism and collectivism.* Boulder, CO: Westview.

Triandis, H. C. (1994). *Culture and social behavior*. New York: McGraw-Hill.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of Social psychology, 54,* 1063-1070.

Wegner, D. (1987). Transactive memory: A contemporary analysis of group mind. In B. Mullen & G. R. Goethals (Eds.), *Theories of Group Behavior* (pp. 185-208). New York: Springer-Verlag.

Weick, K. E. (1995). *Sensemaking in organizations*. Thousand Oaks, CA: Sage Publications.